Desmodium Desv. (Fabaceae) and related genera in Australia: a taxonomic revision

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Summary

Pedley, Les (1999). *Desmodium* Desv. (Fabaceae) and related genera in Australia: a taxonomic revision. *Austrobaileya*.5(2):209–261. The concepts of Ohashi (1973) are adopted and five genera are recognised for Australia: *Aphyllodium* (DC.) Gagnep. (*Dicerma* DC. *sensu* Benth.), *Dendrolobium* Benth., *Desmodium* Desv., *Phyllodium* Desv. and *Tadehagi* Ohashi. A classification of *Desmodium* in Australia, closely following Ohashi's for Asia, is presented. Taxa described as new are: *Desmodium* subg. *Acanthocladum* (type: *D. acanthocladum* F. Muell.), *Desmodium* ser. *Arillata* (type: *D. microphyllum* (Thunb.) DC.), *Desmodium* ser *Sagotia* (type: *D. triflorum* (L.) DC.), *Aphyllodium glossocarpum, A. latifolium, A. parvifolium, A. schindleri, A. stylosanthoides, Dendrolobium multiflorum, Desmodium glareosum, D. pullenii, D. pycnotrichum, D. tiwiense, Phyllodium pulchellum* var. *glabrius, P. hackeri* and *Tadehagi robustum*. New combinations are *Desmodium* sect. *Desmodiopsis* (based on *Alysicarpus* sect. *Desmodiopsis* Schindl.) *Desmodium* ser. *Stenostachys* (based on *Desmodium* sect. *Stenostachys* Schindl., lectotype *D. filiforme* Zoll. & Moritzi), *Dendrolobium cheelii* (based on *Alysicarpus cheelii* C.A. Gardner), *Dendrolobium polyneurum* (based on *Desmodium polyneurum* S.T.Blake), *Dendrolobium umbellatum* var. *hirsutum* (based on *Desmodium umbellatum* var. *hirsutum* DC.) and *Desmodium whitfordii* based on *Desmodium nemorosum* subvar. *whitfordii* Schindl., the last two from the Mascarenes and the Phillipines respectively. Keys to species are provided; new and poorly understood taxa are described and references to descriptions of all others provided; brief notes on distribution and habitat of all species are included; and typification of some species is discussed. Forty-eight Australian species are treated: six *Aphyllodium*, six *Dendrolobium*, 32 *Desmodium*, three *Phyllodium* and one *Tadehagi*.

Key words: *Aphyllodium, Dendrolobium, Desmodium, Dicerma, Phyllodium, Tadehagi*

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Introduction

This account relies heavily on the work of Ohashi (1973), and may be considered a supplement to it. I have adopted Ohashi's circumscription of genera and, in most cases, of species. Where his descriptions of taxa are satisfactory I have merely referred to them. For species widely spread in the Old World or recently introduced into Australia I have referred to other accounts, especially those of Schubert (1971) and Verdcourt (1979).

Ohashi (1973) discussed at some length the various treatments of *Desmodium* sensu lato. Candolle (1825) recognised a large genus *Desmodium* Desv. and much smaller *Nicolsonia* DC. and *Dicerma* DC. (which included *Phyllodium* Desv.). *Dicerma* is an illegitimate name and has to be replaced by *Aphyllodium* (DC.) Gagnep.; this matter is discussed below (p.211). Bentham (1852), taking a rather narrow view of genera, described several as new and recognised Candolle's two sections of *Dicerma* as distinct genera, namely *Phyllodium* Desv. and *Dicerma* DC. (for sect. *Aphyllodium*). Later, however, Bentham (1865a) tergiversated; he wrote "In the first general account of the group which I made for the 'Plantae Junghunianae' it appeared to me that if the universally accepted genera *Dicerma* and *Nicolsonia* of De Candolle are maintained, it would be necessary to keep up several others, and even to establish new ones, for which I gave the characters in that work. I have however, since then, had occasion to examine in detail above a hundred species, . . . and the characters relied on for separation of the smaller genera have proved too uncertain or artificial to be available for any but sectional divisions; that in our 'Genera Planarum' I have found it necessary not only to restore the genus to the

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extent originally contemplated by De Candolle, but to add to it his *Dicerma* and *Nicolsonia* . . .”. He further stated that it was with much hesitation that he refrained from adding to them the small or monotypic genera *Ougeinia* Benth., *Mecopus* Benn. and *Pseudarthria* Wight & Arn. So it was that Bentham (1864, 1865b) and Baker (1879) adopted a broad concept of *Desmodium*. Schindler had different concepts and recognised not only the segregate genera proposed by Candolle (1825) and Bentham (1852) but described several new ones; see Schindler (1928) for details of his numerous papers. Schindler’s views were not generally accepted; Fosberg (1966), for example, was forthright in his opposition, noting of *Desmodium* that ‘some authors have dismembered this very natural and distinctive genus into a number of ill-distinguished segregate genera. Nothing seems to be gained by accepting these, so they are ignored here’. Knaap-van Meeuwen (1962) and Verdcourt (1979), both of whom dealt with floras of regions where segregate genera occur, also ‘kept to the more extended view of *Desmodium*’ (Verdcourt 1979). Ohashi (1973) adopted a position between that of Bentham and his followers and Schindler. On the whole Ohashi et al. adopted Ohashi’s (1973) treatment, though they discussed the difficulties in arriving at a ‘sensible classification’ of Desmodieae.

Adopting a ‘more extended view of *Desmodium*’ has some attraction. Having dealt with Australian and Sri Lankan species which has necessitated a more-than-cursory examination of most of the Old World Desmodiinae I would favour recognition of four genera in Australia, namely *Tadehagi, Desmodium, Phyllodium, Aphyllodium*, with *Dendrolobium* included in *Phyllodium*. However, until further scientific investigation, rather than intuition, informed as it might be, clarifies the situation I am following the classification proposed by Ohashi (1973). Though recorded by Ohashi, *Codariocalyx* does not occur in Australia.

Aphyllodium (DC.) Gagnep., Not. Syst. 3:254 (1916); Pedley, Rev. Handb. Fl. Ceylon 10:106 (1996); Ohashi, Taiwania 42: 142 (1997); *Dicerma* DC., Prodr. 2:339 (1825), Mém. Leg. 326 (1826), incl. sect. *Aphyllodium* DC. but excl. sect. *Phyllodium* (Desv.) DC.; Wight & Arn., Prodr. Fl. Ind. orient. 238 (1834); Benth. in Miq., Pl. Jungh. 217 & 219 (1852); Schindl., Rep. sp. nov. reg. veg. 20:267 (1924); Hutch., Gen. Fl. Pl. 1:483 (1964); Ohashi, Ginkgoana 1:251 (1973), nom. illeg; *Desmodium* sect. *Dicerma* Benth. in Benth. & J.D. Hook., Gen. Pl. 1:519 (1865); *Desmodium* subg. *Dicerma* Baker in J.D. Hook., Fl. Brit. India 2:163 (1876); **Type:** *Aphyllodium biarticulatum* (L.) Gagnep.

Aphyllodium is the most distinctive and well defined of the segregates of the Linnean *Hedysarum* though Bentham (1865b), followed by later authors, referred it (as *Dicerma*) to *Desmodium*. It has united amplexicaul stipules that are mostly divided to the middle, secondary bracts similar in size and shape to the primary bracts, and deeply constricted 1- or 2- jointed pods with orbicular to transversely elliptic (rarely, in *A. glossocarpum*, oblong) articles.

Ohashi (1973) considered *Aphyllodium* (as *Dicerma*) to be related to *Phyllodium* because of the similarity of their inflorescences. The primary bracts are, however, not homologous with the foliar bracts of *Phyllodium* (q.v.) and the genera are not particularly closely related.

Hitherto *Aphyllodium* has been considered to consist of either three species, one widespread and polymorphic (Schindler 1924, Ohashi 1997b), or one species (Ohashi 1973). This study indicates that there are seven species in Australia and New Guinea , one (*A. biarticulatum*) wide ranging and one (*A. novoguineense* (Schindl.)Ohashi) poorly known and probably misunderstood. The misapplication of the name is discussed briefly below.

Nomenclature

The genus *Phyllodium* was described by Desvaux who included in it two species, *P. pulchellum*, based on *Hedysarum pulchellum* L., and *P. lutescens*, based on *H. lutescens* Poir. His description and illustration were derived solely from *P. pulchellum*, and *P. lutescens* has since been transferred to the monotypic genus *Pycnospora*.

Candolle described the genus *Dicerma*, with two sections: *Aphyllodium*, with one species *Dicerma biarticulatum* (*Hedysarum biarticulatum* L.), and *Phyllodium*, Desvaux's genus *Phyllodium*. He explained (1826) that he wished to retain *Phyllodium* in its original sense and had therefore, in adding another section, coined another generic name. Under the current Code of Botanical Nomenclature, Candolle should have used the existing generic name *Phyllodium* for his enlarged genus and because he did not do so, his generic name *Dicerma* was superfluous and therefore illegitimate.

Bentham (1852) treated the two sections of *Dicerma* DC. as genera for which he used the names *Phyllodium* Desv. and, for sect. *Aphyllodium*, the illegitimate name *Dicerma*. In the next 60 or so years the name *Dicerma* was used at generic, subgeneric and sectional rank. Except for its use as a generic name these usages do not conflict with the International Code of Botanical Nomenclature.

Gagnepain, without any discussion at all of the standing of the name *Dicerma*, raised *Dicerma* sect. *Aphyllodium* to generic rank as *Aphyllodium* (DC.) Gagnep. and in doing so provided a legitimate name for *Dicerma* as circumscribed by Bentham (1852). Unfortunately Schindler, who sometimes adopted names which are at variance with the present International Code of Botanical Nomenclature, quibbled about Gagnepain's generic distinctions, but agreed using other criteria that *Aphyllodium* (DC.) Gagnep. was indeed distinct and again applied to it the illegitimate name *Dicerma*. Such has been the prestige of Bentham and Schindler (rightly so as taxonomists) that *Aphyllodium* has not been taken up as a generic name. Conservation of the name *Dicerma* for *Dicerma* sect. *Aphyllodium* is not warranted as it has never been applied to more than three species, two of them little known with narrow geographic ranges. I have therefore used the correct name *Aphyllodium* for the Australian species.

A number of infra-specific taxa of *A. biarticulatum* has been described and a knowledge of the circumscription of these taxa and the rather loose application of their names is essential to an understanding of the taxonomy of the genus in Australia. These matters are dealt with in some detail under *A. biarticulatum*.

Key to species

1. Terminal leaflet more than 12 mm wide, more than 30 mm long and 2.2–3.2 times longer than wide .... **1. A. latifolium**
   Terminal leaflet less than 12 mm wide, if more than 30 mm long then either more than 3 times longer than wide or less than 1.5 times longer than wide 2

2. Leaflets to 4 mm long, 1–2 times longer than wide .... **2. A. parvifolium**
   Leaflets more than 10 mm long, more than twice as long as wide 3

3. Bracteoles 5–9 mm long, more than 1.5 times longer than calyx .... **3. A. schindleri**
   Bracteoles to 5 mm long, only slightly longer than calyx 4

4. Distal (or single) article of pod 7–9 mm long .... **4. A. glossocarpum**
   Articles of pod less than 5.5 mm long 5

5. Leaflets ± acute; stipules 10–20 mm long; petioles 10–16 mm long . **5. A. stylosanthoides**
   Leaflets obtuse; stipules 6–15 mm long; petioles 3–11 mm long ..... **6. A. biarticulatum**

1. Aphyllodium latifolium Pedley, **sp. nov.** habitu simile *A. schindleri* Pedley sp. nov. autem foliolis latioribus minus elongatis, stipulis brevioribus, inflorescentiis brevioribus bracteis brevioribus praeditis, ramulorum pilis patentibus differt. **Typus:** Queensland. Cook District: Dead Horse Creek, 8 km S of Morehead River, 15°04'S 143°43'E, May 1987, *J.R. Clarkson* 7193 & *B.K. Simon* (holo: BRI; iso: BRI, K, L, MBA, NSW, PERTH, QRS) .

Aphyllodium sp. (Edward River J.R. Clarkson 3544) Pedley in Henderson (ed.): Queensland plants: names and distribution: 76 (1997).

Erect shrub to 1.5 m tall, branching from the base; branchlets with indumentum of dense spreading fulvous hairs to 1 mm long; stipules glabrous, 6–10 mm long. Leaflets oblong, elliptic or obovate, rounded at the base, obtuse, minutely apiculate at the apex, margins slightly recurved, appressed pubescent on upper surface, prominently reticulate and appressed pubescent on lower surface; terminal ones 30–50 mm long, 12–16 mm wide, 2–3 times as long as wide, the laterals somewhat smaller; stipels, often hidden in indumentum, c. 0.6 mm long; petioles 10–20 mm long. Inflorescences to 18 cm long; primary and secondary bracts c. 5 mm long; pedicels 1.4–2.4 mm long. Flowers: calyx with indumentum of uncinate hairs c. 0.5 mm long, 3–4 mm long, the tube cylindrical 1.8–2.2 mm long, lobes 1.2–1.8 mm long; bracteoles as long as tube; corolla mauve or purple; standard obovate or orbicular with short claw, 6–7.3 mm long, 3.4–5 mm wide; wings rectangular, auriculate, 4.2–5 mm long, 1–1.7 mm wide on claw 1.2–2 mm long; keel about as long as wings; ovary densely pubescent, style slender, stigma minute, surrounded by hairs. Pods of two articles, densely appressed hairy, each 4–5 mm long, 3.3–4 mm wide; seeds c. 2 mm long, 1.5 mm wide.

Selected specimens: **Queensland.** Cook District: Edward River Aboriginal Reserve, 15°10'S 141°40'E, Oct 1980, *Clarkson* 3544 (BRI, MBA); Edward River, Apr 1980, *Garnett* 10 (BRI); c. 80 km NW of Laura, 15°12'S 143°53'E, Jul 1990, *Pedley* 5520 (BRI); east bank of Little Laura River, S of Laura, [15°32'S 144°20'E], May 1975, *Byrnes* 3419 (BRI); 33 miles [53 km] NE of 'Dunbar' H.S., 87 miles [139 km] ESE of Mitchell River mouth [15°45'S 142°46'E], Aug 1966, *Story* 8029 (CANB).

Distribution and habitat: *Aphyllodium latifolium* occurs on sandy soils on roadsides and in eucalypt woodland in the southern part of Cape York Peninsula. Map 1.

Affinities: The species resembles *A. schindleri*, with which it is sympatric, in habit and general appearance but differs in its wider, less elongate leaflets, shorter stipules, shorter inflorescences with shorter bracts, and the spreading hairs of the branchlets.

Etymology: The specific epithet is a compound of Latin, *latus*, wide, and *folium*, leaf: a reference to the wide leaflets of the species.

2. Aphyllodium parvifolium Pedley, **sp. nov.** ab omnibus aliis speciebus *Aphyllodii* foliis parvioribus usque 4 mm longis, 1–1.2 plo longioribus quam latis et floribus magnis vexillo 7.5–8.5 mm longo ornatis distinguenda. **Typus:** Western Australia. Near Barred Creek, 33 km N of Broome, 17°40'S 122°12'E, 3 April 1988, *K.F. Kenneally* 10612 (holo: PERTH; iso: CANB, DNA).

Prostrate subshrub; branchlets with indumentum of dense, spreading to ascending hairs c. 1 mm long; stipules 4–5.5 mm long with long marginal hairs. Leaflets oblong or orbicular, obtuse at base and apex, moderately dense, long, ascending hairs on both surfaces, terminal and lateral leaflets about equal in size, 3.2–7.5 mm long, 3.2–4 mm wide, c. 1–2 times longer than wide; stipels minute; petioles 2.5–4.5 mm long. Inflorescences to c. 6 cm long; primary and secondary bracts 2–3 mm long; pedicels 1.5–2 mm long. Flower: calyx with sparse indumentum of short uncinate hairs and longer straight marginal ones, 4–4.5 mm long, the tube c. 2.6 mm long, the lobes 1.3–1.9 mm long; corolla pink; standard obovate with short claw, 7.5–8.5 mm long, c. 4 mm wide; wings rectangular, auriculate, c. 5–5.5 mm long, c. 1.2 mm wide on claw 2–2.5 mm long; keel slightly longer than wings; ovary densely pubescent; style flattened towards the tip, stigma minute, fringed with hairs. Pods of 2 articles, appressed hairy on veins, each c. 6 mm long and 4 mm wide; seeds not seen.

Other Specimen: **Western Australia.** McLarty Hills Oil Camp [c. 19°30'S 123°30'E] *J.S. Beard* (PERTH).

Distribution and habitat: The species is known only from the collections cited. Map 2.

Affinities: *Aphyllodium parvifolium* is probably most closely related to *A. biarticulatum* but is easily distinguished by its small leaflets less than 1.5 times longer than wide and its large flowers.

Etymology: The epithet is from Latin *parvus*, small and *folium*, leaf, a reference to the small leaves of the species.

3. **Aphyllodium schindleri** Pedley, **sp. nov**. ab aliis speciebus *Aphyllodii* bracteolis calyce 1.5–3 plo longioribus, 5–9 mm longis, ab *A. latifolio* Pedley foliolis angustioribus, ab *A. glossocarpo* Pedley lomentis brevioribus, speciebus Australiensibus ceteris inflorescentis densioribus longioribusque distinguenda. **Typus:** Queensland. Cook District: 8 km SW of Beagle North Camp, 13°04'S 141°45'E, June 1982, *J.R. Clarkson* 4479 (holo: BRI; iso: BRI, DNA, K, NSW, PERTH, QRS).

Dicerma biarticulatum f. *longibracteatum* Schindl., Rep. sp. nov. reg. veg. 20:268 (1924). **Type**: Carpentaria. Mainland opposite Groote Eylandt, *Brown* '4183' (isosyn: BM, BRI, K).

Aphyllodium novoguineense auct. non (Schindl.) Ohashi; Ohashi, Taiwania 42: 146(1997) p. p.

Aphyllodium sp. (Lockerbie L. J. Brass 18464) Pedley in Henderson (ed.): Queensland plants: names and distribution: 76 (1997).

Shrub to 1.5 m tall; branchlets glabrous or with sparse indumentum of appressed hairs to 2 mm long, often ascending hairs at nodes, or (in Western Australia and Papua New Guinea) of sparse to moderately dense ascending hairs; stipules (10–)13–25 mm long, glabrous, often with a few marginal hairs towards the tips. Leaflets lanceolate, narrowly elliptic, narrowly oblong or oblanceolate, attenuate at the base, acute or occasionally obtuse, mucronulate at the apex, upper surface glabrous or (especially in northern Cape York Peninsula and Papua New Guinea) with sparse appressed hairs, lower surface with sparse appressed hairs to 1 mm long, densest on margins and midrib, often with sparse erect minute (0.05 mm long) glandular hairs as well; terminal leaflets (15–)25–60(–70) mm long, 4.5–11(–22) mm wide, (3–)4–7(–9) times longer than wide, the laterals slightly smaller; stipels glabrous to 2.4 mm long, often less and sometimes hidden in indumentum; petioles 6–18(–24 in New Guinea) mm long; pulvinuses 1–2(–2.7) mm long, laterals slightly smaller than terminal. Inflorescences dense, 6–16 mm long; striate primary bracts (6–)8–12(–16) mm long, secondary bracts 6–14(–16) mm long (specimens from New Guinea at upper ends of ranges), both with hyaline marginal hairs; pedicels 0.7–2.6 mm long. Flower: calyx with sparse indumentum of hooked hairs c. 0.05 mm long, 2.6–3.7 mm long, tube 1.5–2.3 mm, lobes 1.1–1.5 mm long; bracteoles similar in shape and texture to bracts, shorter or longer than the flower, 5–9.3 mm long; corolla white to mauve; standard obovate, 5.6–9.3 mm long, (2.5–)3–6 mm wide; wings narrowly rectangular, sometimes auriculate, 3.5–5.7 mm long, 0.8–1.4 mm wide, on claw 1.4–1.7 mm long; keel about as long as wings; ovary densely appressed pubescent; style flattened in upper half; stigma minute, surrounded by hairs. Pods of 2 (rarely 1) articles, each 3.5–5 mm long, 2.8–4.2 mm wide, appressed hairy; seeds 2.2–2.8 mm long, 1.6–2 mm wide.

Selected specimens: **Western Australia.** Carson River, in 1891, *Bradshaw & Allen* (MEL, NSW 213630); Gorge of Glenelg River, Jul 1950, *Gardner* 9663 (PERTH). **Northern Territory**. Arnhem Land, in 1928, *Basedow* 157 (AD, K); Katherine Gorge National Park, 14°19'S 132°28'E, Jun 1983, *King* 252 (DNA); Groote Eylandt, May 1972, Levitt (DNA); South Bay, Bickerton Is., 13°45'S 136°06'E, Jun 1948, *Specht 508 (AD, BRI, CANB, K, MEL, PERTH); Gove, Jun 1972, *Maconochie* 1532 (DNA, K, MEL, PERTH); c. 39 miles [62 km] NE of Maranboy Police Station, Mar 1965, *Lazarides & Adams* 113 (BRI, CANB); near Knuckey Lagoon, Nicholson's Place, NE of Katherine, Apr 1956, *Burbidge* 5107 (BRI, CANB); 7 km from 'Mudginberri' along road to Oenpelli, 12°33'S 132°54'E, Apr 1980, *Telford* 7752 *& Wrigley* (CANB, CBG); East Alligator River, 11°59'S 133°41'E, Feb 1973, *Dunlop* 326 (DNA); Angularli Creek, Murganella-Oenpelli Road, 11°46'S 133°10'E, Feb 1984, *Whiteman* 1093 (DNA). **Queensland**. Cook District: Cape York, 10°42'S 142°32'E, Jul 1985, *Thiele* 919 (BRI, CANB); Lockerbie, 10 miles [16 km] WSW of Somerset, Apr 1948, **Brass* 18464 (BRI, CANB, K); Captain Billy Landing, 11°35'S 142°43'E, May 1971, *Norris* [AQ 230277] (BRI); Mapoon, 11°58'S 141°52'E, Jun 1985, *Gunness* AG 2024 (BRI); 17 km from Merapah homestead, 13°49'S 142°22'E, May 1987, *Clarkson* 7143 & *Simon* (BRI, K, MBA, QRS). **Papua New Guinea.** Between Laloki & Hiwick R., 9°25'S 147°17'E, Feb 1964, **Womersley* 19094 (BRI, K, L, NSW); Port Moresby, Feb 1937, **Brass* 8781 (BRI, BM).

*These and other specimens seen, determined by Ohashi (1973) as *Dicerma biarticulatum* subsp. *australiense*.

Distribution and habitat: The species occurs in sandy soils, sometimes on sandstone, usually in open eucalypt communities, though also reported from the edges of *Melaleuca* swamps and on coastal dunes. It occurs in the Kimberley region of Western Australia, the Northern Territory (north of about 15°S latitude), eastern Queensland from Cape York south to about 19°S latitude, and near Port Moresby in Papua New Guinea. There are notable disjunctions between the Kimberley and Northern Territory occurrences and across the southern shore of the Gulf of Carpentaria. Map 3.

Affinities: *Aphyllodium schindleri* is distinguished from other species by its dense inflorescences and remarkably long bracts and bracteoles; its closest relative among Australian species is probably *A. latifolium*. From specimens determined by Ohashi at BRI and other herbaria, his key to subspecies and the distribution map published by him (Ohashi 1973), it appears that he considered this to be *Dicerma biarticulatum* subsp. *australiense* Schindl. Schindler (1924) recognised three formae of *D. biarticulatum* var. *australiense*, each of which is treated as a distinct species here. 'Typical' subsp. *australiense* (that is, f. *australiense*, f. '*genuinum*' of Schindler) is included in *Aphyllodium biarticulatum*. The identity of *Dicerma biarticulatum* var. *australiense,* its typification, and the misapplication of the name *Aphyllodium novoguineense* are discussed under *A. biarticulatum*.

Etymology: The specific epithet commemorates Anton Karl Schindler (1879–1964) who, in a remarkably brief but fruitful botanical career in the first quarter of this century, laid solid foundations for later critical work on the Desmodiineae. Regrettably a quantity of his work remained unpublished on his retirement from plant taxonomy (see Schubert 1964).

4. Aphyllodium glossocarpum Pedley, **sp. nov.** ab aliis speciebus *Aphyllodii* fructibus in lomenta distincta aegre separatis, lomento solitario vel distali 7–9 mm longo purpurascenti distinguenda. **Typus:** Western Australia. 19.5 km from Beagle Bay Mission turn-off on the road to Cape Leveque, June 1981, *B.R. Maslin* 4928 (holo: PERTH; iso: BRI, K).

Dicerma biarticulatum f. *plumosum* Schindl., Rep. sp. nov. reg. veg. 20:268 (1924). **Type:** Western Australia. Brunswick Bay, Oct 1820, *A. Cunningham* 267 (holo: K; iso: BM).

Desmodium novae-hollandiae var. *caudatum* Domin, Biblioth. Bot. 89:212 (1926). **Type**: Western Australia. Brunswick Bay, Oct 1820, *A. Cunningham* 267 (holo: K; iso: BM).

Shrub to 2 m tall; branches with sparse indumentum of appressed hairs c. 1 mm long; stipules ± glabrous, 5–12 mm long. Leaflets linear, narrowly oblong or narrowly obovate, obtuse at the base, obtuse or acutish at the tip, glabrous on the upper surface, sparsely appressed pubescent on the lower; terminal leaflets 15–40 mm long, 3.5–5.5 mm wide, 3.5–8 times longer than wide, the laterals slightly smaller; stipels c. 0.5 mm long; petioles 5–10 mm long. Inflorescences to c. 25 cm long; primary bracts 3.5–5.5 mm long, secondary bracts slightly smaller, both with a few marginal hairs; pedicels 1.4–2.5 mm long. Flower: calyx with sparse indumentum of short (c. 0.05 mm long) uncinate hairs, 3.5–4.5 mm long, the tube c. 2 mm long, the lobes 1.5–2.5 mm long; bracteoles about as long as the tube; corolla mauve to pale purple; standard obovate 6.5–7.5 mm long, 3.5–4.5 mm wide; wings narrowly

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rectangular, not auriculate, 4–5 mm long, 1.2–1.4 mm wide, on claw 2–2.4 mm long; keel about as long as wings; ovary densely pubescent; stigma surrounded by hairs. Pods 1 or 2 seeded, scarcely divided into distinct articles, the proximal one 5.5–7.5 mm long, the distal or single one longer, 7–9 mm long, all 3.2–4.5 mm wide, appressed pubescent; seeds c. 3 mm long and 2 mm wide.

***Specimens*: Western Australia.** 1 km NW of Beagle Bay Mission, 16°59'S 122°40'E, Apr 1985, *Martin* 31 (CANB, PERTH); Wonganut Spring, 19 km ESE of Coulomb Point, Dampier Penin., 17°15'S 122°19'E, Jun 1984, *Kenneally* 9039 (PERTH).

***Distribution and habitat*:** The species is known only from the four collections cited, all from coastal areas of the Kimberley region, Western Australia. Cunningham's specimen probably came from Marigui Promontory (c. 15°15'S 125°00'E) where he 'obtained a large addition to his collection' (King, 1827:439) on this, the last anchorage of the 'Mermaid' on the north-west coast. It is reported to occur on sand (Kenneally, in sched.) Map 4.

***Affinities*:** *Aphyllodium glossocarpum* bears a general resemblance to *A. biarticulatum* but differs from it and other species in having purplish fruits which are scarcely divided into distinct articles. The single or distal loment (when two are found) is 7–9 mm long.

***Etymology*:** The epithet is from Greek *glossa*, tongue and *karpos*, fruit, an allusion to the long purplish tongue-like articles of the fruit.

5. Aphyllodium stylosanthoides Pedley, **sp. nov.** aspectu distinctivo sed simul *A. biarticulato* (L.) Gagnep. arcte affinis a quo differt stipulis plerumque longioribus, 10–20 mm longis, petiolis longioribus, 10–16 mm longis, foliolis plus minusve acutis longioribus, (15–)20–35(–55) mm longis, elongatioribus, 4–7(–12)-plo longioribus quam latis; ab *A. schindleri* Pedley foliolis plerumque angustioribus, 3–6 (raro 12) mm latis, bracteis plerumque brevioribus, 4.5–10.5 mm longis, bracteolis brevioribus, 3.5–4.2 mm longis; ab *A. latifolio* Pedley stipulis longioribus, foliolis angustioribus elongatioribus. **Typus:** Western Australia. Near Wonjarring Gorge in Carson Escarpment, 10 km E of ' Theda' H.S., 25 March 1978, *M. Lazarides* 8712 (holo: CANB; iso: BRI, K, NSW, PERTH).

Erect or ascending annual stems to c. 1 m from perennial woody rootstock; branchlets with indumentum of sparse to moderately dense appressed hairs up to 2 mm long; stipules 10–20 mm long, glabrous or with a fringe of hairs. Leaflets linear, narrowly oblong, narrowly elliptic or occasionally oblanceolate or narrowly obovate, ± acute, glabrous on upper surface, with sparse appressed hairs on lower surface, dense on margins and midrib, as well as minute (× 20 needed) hairs on lower surface, rarely also on upper; terminal leaflets 15–35(–55) mm long, 3–6(–12) mm wide, 4–7 times longer than wide, laterals a little smaller; stipels glabrous, c. 1–1.5 mm long; pulvini densely pubescent, 1–2 mm long; petioles 10–16 mm long. Inflorescences to 12.5 cm long, but often shorter; primary bracts 4.5–10.5 mm long, secondary bracts slightly shorter; pedicels 1.5–2 mm long. Flower: calyx with sparse short hooked hairs, 3.3–4 mm long; corolla pink; standard narrowly ovate c. 6.5 mm long, 3.3–4 mm wide; wings narrowly rectangular, not auriculate, 4–5.2 mm long, 0.5–1.2 mm wide on claw 1.5–2 mm long; keel about as long as the wings; ovary densely pubescent, style flattened towards the tip. Pods of 1 or usually 2 articles, each 3.8–5.3 mm long, 2.8–4 mm wide, rather sparsely pubescent at maturity with short appressed hairs; seeds c. 3 mm long, 1.5–2 mm wide.

***Selected specimens*: Western Australia.** Carson Escarpment, S of Coucal Gorge, Drysdale River National Park, ± 150°2'S 126°49'E, Aug 1975, *George* 13883 (PERTH); Bioga Falls, Drysdale River National Park, 15°08'S 127°06'E, Aug 1975, *Kenneally* 3061 (PERTH). **Northern Territory**. 10 km SE of Nourlangie Ranger Station, 12°50'S 132°42'E, May 1980, *Lazarides* 8890 (CANB); 5 km NNW of Koongarra, 12°50'S 132°50'E, May 1980, *Craven* 5580 (CANB, MEL); 21.5 miles [34.5 km] from Adelaide River camp, 13°02'S 131°03'E, Aug 1946, *Blake* 16715 (BRI, DNA); 6 miles [10 km] from Litchfield, 13°27'S 130°30'E, Jul 1946, *Blake* 16644 (BRI, DNA, K, MEXU, MO); Noonamah [12°38'S 131°04'E], Apr 1968, *Byrnes* NB602 (DNA, NSW).

***Distribution and habitat*:** The species has been recorded from habitats similar to those of *A.*

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schindleri: sandy soil, sometimes shallow or rocky, in eucalypt communities (*Eucalyptus tetrodonta* F. Muell and *E. miniata* A. Cunn. ex Schauer particularly), but also in damp situations where it is associated with *Melaleuca* spp. It occurs in the eastern part of the Kimberley region of Western Australia and the north-western part of the Northern Territory. Map 5.

Affinities: *Aphyllodium stylosanthoides* has a distinctive facies but appears to be close to *A. biarticulatum*. It has generally longer stipules, petioles and leaflets; the leaflets are more or less acute and have a greater length/width ratio. It is less closely related to *A. schindleri* and *A. latifolium*; the former has longer bracteoles and usually longer bracts and wider leaflets; and the latter shorter stipules and wider leaflets.

Etymology: The specific epithet is derived from the generic name *Stylosanthes*. In habit and in its rather slender reddish stems, *A. stylosanthoides* resembles some species of *Stylosanthes* introduced into tropical Australia as fodder plants.

6. Aphyllodium biarticulatum (L.) Gagnep., Not. Syst. 3(8):254 (1916); Pedley, Rev. Hand. Fl. Ceylon 10:167 (1996); *Dicerma biarticulatum* (L.) DC., Prodr. 2:339 (1825), nom. illeg.; *Echinolobium biarticulatum* (L.) Desv., Mem. Soc. Linn. Paris 4:310 (1825); *Desmodium biarticulatum* (L.) F. Muell., Fragm. Phyt. Austr. 2:121 (1861); *Hedysarum biarticulatum* L., Sp. Pl. 747 (1753). **Type:** Herb. Hermann vol. 3 fol. 15, No. 296 (lecto: BM, *fide* Pedley in Turland & Jarvis (1997)).

Dicerma biarticulatum var. *australiense* Schindl., Rep. sp. nov. reg. veg. 20:268 (1924) (excl. f. *longibracteatum* Schindl. & f. *plumosum* Schindl.); *Desmodium biarticulatum* var. *australiense* (Schindl.) Meeuwen, Reinwardtia 6:247 (1962); *Dicerma biarticulatum* subsp. *australiense* (Schindl.) Ohashi, Ginkgoana 1:255 (1973); *Aphyllodium australiense* (Schindl.) Ohashi, Taiwania 42: 143 (1997). **Type**: Bowen River, *Bowman* 269 (lecto: MEL, chosen here).

Desmodium novae-hollandiae Domin, Biblioth. Bot. 89:212 (1926) var. *novae-hollandiae* ('*typicum*' Domin). **Type**: Sandige Mischwalder in der Nahe der Russell-Mundung, Feb 1910, *Domin* '4758' (lecto: PR 527353, chosen here).

Desmodium novae-hollandiae f. *latifolium* Domin, loc. cit. **Type**: Savannenwalder zwischen Chillagoe und Walsh River, Feb 1910, *Domin* '4755' (holo: PR 527350).

Prostrate, ascending or erect subshrub to c. 0.5 m high usually with dense indumentum of appressed or somewhat spreading white hairs to c. 1 mm long; stipules 4–13(–15) mm long with a few hairs on margin or tip. Leaflets linear, narrowly elliptic, narrowly obovate, elliptic or obovate, attenuate at the base, obtuse, mucronulate at the apex, glabrous or with sparse appressed or weak ascending hairs on upper surface, sparsely appressed pubescent or with rather dense ascending hairs on lower surface; terminal ones 7–25(–38) mm long, 2–6.5(–10) mm wide, (1.5–)2.5–6.5(–9) times longer than wide, the laterals usually a little smaller, (6–)7.5–22 mm long, 2–6(–8) mm wide, 1.5–5.5(–9) times longer than wide; stipels 0.3–0.7(–1) mm long often hidden in the hairs of the pulvinuses which are 0.6–1(–1.5) mm long; petioles 3–9(–12) mm long. Inflorescences terminal and axillary, rather dense, up to 20 cm long, the rachis with indumentum of moderately dense short uncinate hairs, often with some straight appressed hairs towards the base; primary bracts 3.5–10 mm long, secondary bracts 2.5–7 mm long, pedicels with indumentum of short uncinate hairs, 0.9–1.8(–2.7) mm long at anthesis. Flower: calyx with sparse indumentum of short uncinate and a few long straight white hairs, 2.5–3.5(–4) mm long, the tube 1.2–1.8(–2.2) mm long, the lobes about equal in length, 1.2–2.2 mm long; bracteoles (1.7–)2–3.6(–4.8) mm long; corolla described by most collectors as mauve or pink, but also bluish, purple or red, standard obovate, (5–)5.5–7.5 mm long, (2.5–)3–4.4 mm wide; wings narrowly oblong, ± auriculate, obtuse (2.8–)3–4.7 mm long on claw (0.6–)0.8–1.3 mm long; keel petals about as long as the wings; ovary with dense appressed or rarely ascending hairs. Pods with 1 or 2 articles, each 3–5 mm long, 2.5–4 mm wide with indumentum of appressed hairs, glabrescent, or dense ± spreading and often persistent hairs; seeds 2–3.8 mm long, 1.2–2.2 mm wide.

***Selected specimens*:** **Western Australia.** Near junction of Drysdale River & Mogurnda Creek, 15°02'S 126°55'E, Aug 1975, *George* 1353 (PERTH); 60 km from Kununurra, 16°01'S 128°46'E, Apr 1977, *Pullen* 10686 (CANB, NSW). **Northern Territory.** 30 miles [48 km] E of 'O.T.' Station, Aug 1948, *Perry* 1487 (BRI, CANB, NSW); 11 miles [18 km] NE of 'Alexandria' Station, Jun 1948, *Perry* 1472 (AD, BRI, CANB, K, MEL, NSW, PERTH). **Queensland.** Burke District: Woolgar, c. 19°40'S 143°10'E, Aug 1915, *Bick* (BRI, NSW); Between 'Corinda' & 'Westmoreland, 17°40'S 138°28'E, *Pullen* 10686 (CANB, NSW); Albert River, *Mueller* (K, MEL); Sweers Is., Nov 1802, *Brown* (BRI, BM); same place, *Henne* (MEL) & same place, Jun 1901, *J.F. Bailey* [AQ 97444] (BRI); 'Chudleigh Park' Station, 110 miles [176 km] N of Hughenden, Feb 1931, *Hubbard & Winders* 7606 (BRI, K); Cook District: Yorkey's Knob beach, Apr 1962, *McKee* 9034 (BRI, CANB, K, NSW); 3 miles [5 km] E of Mareeba, May 1953, *Thorne* 21116 & *Jones* (BRI, RSA); North Kennedy District: Magnetic Is., Jan 1931, *Hubbard & Winders* 6665 (BRI, K); 6 km N of Elliot River, c. 19°50'S 147°50'E, Apr 1975, *McDonald & Batianoff* 1386 (BRI, K); Mitchell District: c. 12 km SW of Barcaldine 23°29'S 145°12'E, Jun 1977, *McDonald* 2692 (BRI); ad opp. Jericho, *Domin* '4760' (PR).

***Distribution and habitat*:** *Aphyllodium biarticulatum* is restricted to sandy soils in open situations in eucalypt communities, on coastal dunes, on roadsides and occasionally in cultivation. In Australia it extends from the northern part of the Kimberley region of Western Australia, across the north of the Northern Territory to Queensland south to the Tropic of Capricorn. It appears to be more common in the east of its range than it is in the west. Its extreme variability within Australia is discussed below. Outside Australia it extends through Malesia to southern China, Indo-China, India and Sri Lanka. Map 6.

***Affinities*:** The species is closely related to *A. parvifolium*, *A. stylosanthoides* and *A. hispidum* (Schindl.) Ohashi which have rather restricted ranges, the first two in north-western Australia, the last in south-eastern Asia. *A. latifolium*, *A. schindleri*, *A. glossocarpum* and probably *A. novoguineense* are less closely related to it and may represent a more remote evolutionary line.

***Variation and typification*:** Beside nomenclatural problems discussed (p. 211) the treatment of *Hedysarum biarticulatum* L. has been confused by different classifications resulting from differing concepts of genera and infra-generic taxa.

Mueller (1861), in transferring *H. biarticulatum* to *Desmodium* noted that Wight's figure (Icon. Plant. Ind. Or. 2 (1841) t. 419) did not at all clearly represent ('haud clare exprimit') the Australian species, but invoked the authority of J.D. Hooker in treating Indian and Australian species as the same. Bentham (1864) noted that some Australian specimens differed from the Indian ones but considered all belonged to one species; despite Bentham's remark to the contrary, Wight's figure is not a good representation of the species, either in India or Australia.

Schindler (1924) and Domin (1926) used much the same set of specimens, but independently produced significantly different infra-specific classifications of *A. biarticulatum*. Schindler considered the whole genus *Dicerma* (sensu Bentham) while Domin only the Australian occurrences of *Desmodium biarticulatum* sensu Mueller (and Bentham). Schindler described *Dicerma hispidum* and *D. novoguineense* from single specimens from Burma and New Guinea respectively and divided *Dicerma biarticulatum* into six taxa: three varieties, one consisting of three formae. They are:

Dicerma biarticulatum (L.) DC.

- var. *biarticulatum*
- var. *collettii* Schindl.
- var. *australiense* Schindl.
  - f. *australiense* (f. *genuinum* Schindl., nom. inval.)
  - f. *longibracteatum* Schindl..
  - f. *plumosum* Schindl.

He considered *D. biarticulatum* var. *biarticulatum* to be widely spread on all coasts of the Indian Ocean and to be very uniform everywhere. Evidently, however, he did not believe it to occur in Australia as he cited no Australian specimens and considered *Desmodium biarticulatum* sensu Mueller and Bentham to be *Dicerma biarticulatum* var. *australiense* which he described as 'varietas valde variabilis'. I have seen no material of *Dicerma biarticulatum* var. *collettii* which was described from a single collection from "Upper Burma". *Dicerma biarticulatum* f. *longibracteatum* and f. *plumosum* are treated here as distinct species *Aphyllodium schindleri* and *A. glossocarpum* respectively. With the removal of these, var. *australiense* still exhibits a wide range of variation..

Domin placed *Hedysarum biarticulatum* in *Desmodium* and described *D. novae-hollandiae* as new, referring to it most, though not all, Australian specimens previously considered *D. biarticulatum*. He subdivided *D. novae-hollandiae* into four taxa: two varieties, one made up of two formae:

Desmodium novae-hollandiae Domin

var. *novae-hollandiae* (var. *typicum* Domin, nom. inval.)

f. *novae-hollandiae* - automatically

f. *latifolium* Domin

var. *caudatum* Domin

Desmodium biarticulatum var. *caudatum* is based on *Cunningham* 267 which is also the type of *Dicerma biarticulatum* f. *plumosum* Schindl. and consequently is treated here as *Aphyllodium glossocarpum*. Here the correspondence between Domin's and Schindler's classifications ends. Domin was aware of the diffuseness of his classification and remarked that in f. *latifolium* one could see a weak approach to var. *caudatum* and that *Brown* '4183' was almost intermediate between the type (that is, f. *novae-hollandiae*) and var. *caudatum*. *Brown* 4183 is, in fact, one of the two syntypes of *Dicerma biarticulatum* f. *longibracteatum* Schindl. Furthermore, Domin cited one specimen as *Desmodium biarticulatum* sensu stricto, *Schultz* 534, which is a syntype of *Dicerma biarticulatum* f. *australiense* Schindl.

Later workers have modified Schindler's scheme of classification but have paid scant attention to Domin's. Regrettably these later workers have either not consulted Schindler's and Domin's type specimens or, if they have, they have not cited them. Knaap-van Meeuwen (1962) included *Dicerma* in *Desmodium*. She suggested that *Desmodium novae-hollandiae* to be not specifically distinct from *D. biarticulatum* (to which she also referred *Dicerma biarticulatum* var. *collettii, Dicerma hispidum* and *Dicerma novoguineense*) and transferred *Dicerma biarticulatum* var. *australiense* to *Desmodium biarticulatum*. Study of her key shows that her concept of var. *australiense* was based entirely on f. *longibracteatum* and not at all on either f. *australiense* or f. *plumosum*. Verdcourt (1979), whose work was not intended to be a critical treatment, followed Knaap-van Meeuwen exactly.

To a large extent Ohashi (1973) adopted Schindler's generic concepts but, with a change of rank, Knaap-van Meeuwen's treatment of infrageneric taxa. He accepted *Dicerma biarticulatum* subsp. *biarticulatum*, subsp. *australiense* (Schindl.) Ohashi and subsp. *hispidum* (Schindl.) Ohashi. From the key to subspecies, the distribution map of *Dicerma biarticulatum* and the photograph of *Brass* 18464, it is evident that Ohashi also based his subsp. *australiense* solely on *Dicerma biarticulatum* f. *longibracteatum*. Ohashi cast doubt on Knaap-van Meeuwen's treatment of *Dicerma novoguineense* but took no action, probably because he had seen no specimen. Ohashi (1997b) accepted *Aphyllodium* as the correct name for the genus previously treated by Bentham as *Dicerma* (see p. 211). He effected the transfer of some names from *Dicerma* to *Aphyllodium* and modified his previous treatment. In doing so he further complicated an already tangled situation. He cited no specimens, type or otherwise, and seems not to have appreciated the desirability of lectotypifying names to establish their application. He changed the status of *Dicerma biarticulatum* f. *australiense* which he raised to specific rank as *Aphyllodium australiense*. He transferred *D. novoguineense* to *Aphyllodium*, placing *D. biarticulatum* f. *longibracteatum*, f. *plumosum* and f. *australiense* (p. p.) in its synonymy. He gave its distribution as Australia and New Guinea. Perhaps, appreciating that *D. novoguineense*, *D. biarticulatum* f. *longibracteatum* and *D. biarticulatum* f. *plumosum* differ from *D. biarticulatum* f. *australiense* most conspicuously in having larger leaflets, stipules and bracts, he referred them to *A. novoguineense*, since the epithet *novoguineense* must be used at specific rank.

Application of the name *A. novoguineense* presents a major difficulty. I have not seen the type but have seen one poor specimen of the species (*J.H. Barrett* 4270, BRI ex LAE) collected from near the type locality, Astrolabe Range, Papua New Guinea. Examination of it and a reading of the protologue have persuaded me that it represents a species distinct from *A. schindleri* (*D. biarticulatum* f. *longibracteatum*), *A. glossocarpum* (*D. biarticulatum* f. *plumosum*) and *A. australiense*, the last of which as lectotypified (p. 216), is the same as *A. biarticulatum* sensu stricto. *A. novoguineense* has stems with long ascending fulvous hairs and usually longer stipules and bracts than have other taxa. It appears to be rare and restricted to Papua New Guinea.

In habit, size and shape of vegetative parts and in the indumentum of stems, leaves and pod-articles *A. biarticulatum* is extremely variable, with the degree of variability within Australia probably greater than it is outside the continent. This variability is reflected in the different treatment of species discussed above. Study of specimens from Sri Lanka (Pedley 1996), the type locaity of *Hedysarum biarticulatum*, indicated that though the plants there tend to have somewhat smaller stipules and primary and secondary bracts, they fall within the range of variability of Australian plants and recognition of a subspecies or variety for Australian plants is not warranted.

After specifically distinct entities have been removed *A. biarticulatum* remains a disconcertingly variable species. Preliminary studies suggested that two variants could be recognised: (a) a prostrate plant with narrow (2–3 mm wide) leaflets found usually on coastal sands on the east coast, and (b) subshrub with short obovate leaflets 1.5–3 times longer than wide with large pod articles with dense somewhat spreading hairs which occurs in semi-arid areas inland around the south-western part of the Gulf of Carpentaria. Though extremes of these variants are distinctive the variants merge into the more ‘typical’ populations of the species and formal recognition is not warranted.

Dendrolobium (Wight & Arn.) Benth. in Miquel, Pl. Junghuniana: 215,216 (1852); Schindl., Rep. sp. nov. reg. veg. 20:278 (1924); Hutchinson, Gen. Pl. 1:483 (1964); Ohashi, Ginkgoana 1:50 (1973), Taiwania 42: 135 (1997); *Desmodium* subg. *Dendrolobium* Wight & Arn., Prodr. 1:223 (1834); Baker in J.D. Hooker, Fl. Brit. India 2: 161 (1876); *Desmodium* sect. *Dendrolobium* (Wright & Arn.) Benth. in Bentham & J.D. Hooker, Gen. Pl. 1:519 (1868). Type: *Dendrolobium umbellatum* (L.) Benth.

Holtzea Schindl., Rep. sp. nov. reg. veg. 22:285 (1926). **Type**: *H. umbellata* Schindl. (= *Dendrolobium stipatum* S.T. Blake).

Ohashi (1973) characterised *Dendrolobium* by its axillary subumbellate inflorescences, uniparous flowers, monadelphous stamens, conspicuously long styles, thick corky or coriaceous pericarps and conspicuously rim-arillate seeds. The inflorescences of *D. polyneurum* are elongate racemes, but the combination of the other characters listed distinguished *Dendrolobium* sharply from all other genera except *Phyllodium*. The emphasis placed on the foliaceous bracts of *Phyllodium* obscures the relationship of it with *Dendrolobium*. This relationship is discussed under *Phyllodium*.

Ohashi (1973) recognised 11 species in the genus with the Indo-Chinese region the centre of diversity with eight species occurring there. The recognition of five species confined to the Australian region in the present study places northern Australia as another area of speciation. Some of the Australian species are adapted to a strongly seasonal climate with wildfires in the dry season.

Key to species

1. Lower calyx lobe markedly (1 mm or more) longer than other lobes 2
   Lower calyx lobes almost the same length as other lobes 3

2. Plant prostrate; branchlets with spreading or ascending hairs; pedicels 4–10 mm long; bracteoles c. 1 mm long. . . . . **1. D. multiflorum**
   Plant a shrub or tree to 6.5 m (? 12.5 m); branchlets with dense white appressed hairs; pedicels c. 2 mm long; bracteoles 2.5–3.6 mm long . . . **6. D. arbuscula**

3. Flowers in elongate racemes, axis up to 70 mm long; leaflets with dense silvery appressed hairs on underside. . . . . **2. D. polyneurum**
   Flowers in umbellate racemes, sessile or axis to 10 mm long; undersides of leaflets with appressed hairs, sometimes dense but not silvery. 4

4. Wing petals shorter and much narrower than the keel petals; terminal leaflets 50–140(–170) mm × (25–)35–70(–85) mm . . . . **5. D. umbellatum**
   Wing petals as long as or longer than keel petals and not markedly narrower than them; terminal leaflets to 65 mm × 30 mm 5

5. Veins conspicuously depressed on upper surface of leaflets; terminal leaflets 8–14(–17) mm wide; pedicels (2–)5–7 mm long; . . . . **3. D. cheelii**
   Veins not conspicuously depressed on upper surface of leaflets; terminal leaflets 17–30 mm wide; pedicels 6–16 mm long . . . . **4. D. stipatum**

1. Dendrolobium multiflorum Pedley, **sp. nov.** affinis *D. stipato* S.T. Blake; habitu prostrato, plerumque petiolis brevioribus, foliolatis latioribus instructis, calycis lobis (praesertim inferioribus) longioribus petalis parvioribus differt. **Typus:** Northern Territory: 4 miles [6 km] SE of Katherine [14°29'S 132°19'E], December 1963, *M. Lazarides* 6995 (holo: CANB; iso: BRI, DNA, MEL, PERTH).

Annual stems up to 1.2 m long trailing from perennial rootstock; branchlets angular with indumentum of crisp matted hairs to 0.5 mm long; stipules striate, pubescent on the outside, 4–7 mm long. Leaflets ovate or broadly ovate, obtuse or slightly mucronulate, discolorous, sparse slightly ascending hairs on both surfaces, mainly on veins beneath, sometimes becoming glabrous on upper surface, 8–11 lateral veins on each side of midrib; terminal leaflet 50–90 mm long, 30–55 mm wide, laterals distinctly smaller 30–45 mm long, 17–35 mm wide, both 1.3–2 times longer than wide; rachis 8–17 mm long, petiolules 1.3–2.3 mm long, stipels 1–3 mm long, petioles 8–11 mm long. Flowers in fascicles of 10–20, sessile in the upper axils; bracts 2–2.5 mm long, bracteoles sometimes a little below the base of the calyx, c. 1 mm long; pedicels 4–10 mm long, with spreading white hairs. Flowers: calyx with spreading hairs, 5.3–6 mm long, tube c. 1.7 mm long, upper lobe 2.3–3.5 mm long, laterals the same size or shorter, 2.3–3 mm long, the lower setulose, incurved, distinctly longer, 3.6–4.4 mm long; corolla white or yellowish tinged with pink: keel oblong, rounded at the top, narrowed but not clawed at the base, 6.5–8 mm long, 4.5–6 mm wide; wings 4.5–6 mm long on claw 1–1.5 mm long, slightly shorter (by 0.5 mm) than keel petals; ovary pubescent with 1 ovule. Pod not seen.

Other specimens: **Northern Territory**. 22.4 miles [35.8 km] E of Adelaide River [c. 13°25'S 131°25'E], Mar 1961, *Chippendale* NT 7716 (BRI, DNA, K MEL, PERTH); Bull Creek, 13°54'S 131°17'E, Jul 1946, *Blake* 16294 (BRI).

Distribution and habitat: The species is restricted to a small area in the extreme north of the Northern Territory where it occurs on sandy soils. Map 7.

Affinities: *Dendrolobium multiflorum* appears to be related to *D. stipatum* but differs in its prostrate habit, wider and usually less elongate leaflets, fascicles with more flowers and the lower lobe of the calyx longer than the others.

Etymology: The specific epithet is derived from Latin, *multus* many, and *flos, floris*, flowers, an allusion to the plant's many flowered fascicles.

2. Dendrolobium polyneurum (S.T. Blake) Pedley, **comb. nov.**

Desmodium polyneurum S.T. Blake, Austr. J. Bot. 2:119 t.3 (1954). **Type:** Northern Territory. Near Station Creek, 13°42½'S 131°04'E, July 1946, *S.T. Blake* 16474 (holo:BRI; iso:K).

Ascending annual stems to 1 m long arising from perennial rootstock; branches ± terete with indumentum of dense appressed matted hairs c. 1 mm long; stipules deltoid, connate nearly to the middle, pubescent 3–5.5 mm long, early deciduous. Leaves: leaflets obovate or oblong, obtuse or retuse, sometimes mucronulate, lamina with dense short appressed hairs on both surfaces, becoming rather sparse on upper surface, 10–13 lateral veins on each side of midrib; terminal leaflet 40–90 mm long, 23–70 mm wide, 1.6–2 times longer than wide, laterals smaller, usually oblong, 35–70 mm long, 20–40 mm wide; stipels setaceous, 1–2 mm long; petiolules 2–3.5 mm long, rachis 4–20 mm long; petioles 3–20 mm long. Flowers in axillary racemes up to 70 mm long, the young unopened flowers crowded at the apex of the rachis; bracts ovate-acuminate, 2–3 mm long, deciduous; pedicels 2–7 mm long; bracteoles 1.5–2 mm long. Flowers: calyx 5.5–7.5 mm long, tube 3 mm long, obtuse at base, gradually widening upwards; lobes lanceolate, acute, the two upper ones at first connate nearly to the tip, finally separating; corolla white: standard obovate, c. 10 mm long and 7 mm wide, ± clawed; wings 10 mm long, spurred near the base; keel petals as long as the wings, subobtuse, slightly incurved; ovary hirsute. Pods densely pubescent becoming only moderately so when old, both margins constricted between the seeds; articles (1–)2–4, longitudinally oval, nearly symmetrical, 6–9 mm long, 5–6 mm wide, woody and indehiscent; seeds not seen mature.

Selected specimens: **Northern Territory.** 2.5 miles [4 km] SW of 'Tipperary' homestead, Jul 1961, *Lazarides* 6677 (CANB, K, MEL PERTH); 39 miles [50 km] SW of 'Dorisvale' Station [14°46'S 131°06'E] May 1952, *Perry* 2796 (CANB, K, MEL); 6 miles [10 km] N of Wilton River Crossing, Jun 1972, *Byrnes* 2617 (DNA, K).

Distribution and habitat: *Dendrolobium polyneurum* occurs only in the northern part of the Northern Territory on sandy soils in eucalypt communities. It has not often been collected and seems to be rare. Like *D. cheelii* and *D. stipatum* the species appears to be a pyrophyte with annual stems arising from a woody perennial rootstock. Map 8.

Affinities: In the protologue of *Desmodium polyneurum*, Blake referred it to *Desmodium* sect. *Dollinera* (Endl.) Schindl. and it does bear a general resemblance to some species of that section, particularly *D. hayatae* Ohashi. Its monadelphous stamens and bracteoles support such a placement, but the structure of its inflorescence is quite different from that of sect. *Dollinera*. Its flowers are arranged in long axillary racemes, each pedicel subtended by a bract, whereas in sect. *Dollinera* flowers are in 6–8 flowered fascicles; that is, each bract subtends 6–8 pedicellate flowers. Though long racemes are unusual in *Dendrolobium*, Ohashi (1973:14) noted some specimens of *D. umbellatum* and *D. triangulare* (Retz.) Schindl. with 'a few axillary racemes mixed with short racemes or subumbels'. The pods of *D. polyneurum* are similar to those of other species of *Dendrolobium* such as *D. arbuscula* and *D. umbellatum*. Though its axillary racemes sets it apart from all other species the affinities of *D. polyneurum* are with *D. stipatum* and *D. cheelii*.

3. Dendrolobium cheelii (C.A. Gardner) Pedley, **comb. nov.**

Alysicarpus cheelii C.A. Gardner, West. Austr. For. Dept. Bull. 32:57 (1923).

Type: Western Australia. Between Vansittart and Napier Broome Bays, August 1921, *C.A. Gardner* 1040 (holo: PERTH).

Erect annual stems to 0.5 m tall from perennial woody rootstock; branches with indumentum of moderate to dense appressed, often matted hairs 0.5–0.7 mm long; stipules 3–6 mm long, striate, sparsely to densely hairy outside, glabrous inside. Leaves (1-) or 3- foliolate; leaflets elliptic or obovate, obtuse or rarely slightly acuminate, mucronulate, sparsely pubescent with appressed or weak, slightly ascending hairs on both surfaces, mainly on veins beneath, 4–10 lateral veins on each side of midrib, deeply impressed on upper surface; terminal leaflet (13–)20–60 mm long, (4–)8–14(–18) mm wide, 2.5–4.5 times longer than wide, laterals somewhat smaller; stipels to 1.8 mm long, slightly longer than the petiolules; petiolules 0.5–1.5 mm long, rachis 1–6 mm long; petioles 4–10 mm long. Flowers in fascicles of 3–8 in upper axils; bracts and bracteoles c. 1 mm long, pedicels (2–)5–7 mm long. Flowers: calyx 3.5–4 mm long with sparse, longish, ± appressed hairs and short, ± erect, uncinate hairs, tube 1.7–2 mm long, lobes of ± equal length, 1.6–2 mm long, or the lower to 2.5 mm long, longer than the others; corolla pink or yellow with a pink keel; standard ± orbicular 4.8–5.5 mm long, 3.5–4.5 mm wide, on claw c 1.5 mm long; wings 4.5–5.5 mm long, c 1.8 mm wide, on claw 1.7 mm long; keel petals slightly shorter than the wings; ovary densely pubescent, ovules up to 3. Pod of 1 or 2 articles, each about 8 mm long and 5 mm wide, reticulately veined, densely pubescent; seeds not seen.

Other specimens: **Western Australia.** Near Carlia Creek, near Carson River, Drysdale River National Park, 15°02'S 126°49'E, Aug 1975, *George* 13939, sterile (PERTH); Little Falls, 14°49'S 125°42'E, July 1976, *Lewis* 44 (K, PERTH); 4 miles [6 km] N of mining campsite, Mitchell Plateau, 14°47'S 125°48'E, Dec 1982, *Kenneally* 8666 (PERTH); Gibb River, Hann District, Jan 1951, *Gardner* 9893 (PERTH).

Distribution and habitat: *Dendrolobium cheelii* is confined to the Kimberley region of Western Australia where it occurs on sandy or loamy soils in eucalypt woodland. It is a pyrophyte with annual stems arising from a perennial rootstock. One specimen (*George* 13939) is sterile and has somewhat larger leaves than other specimens and is possibly from a plant surviving from the previous wet season. Map 9.

Affinities: The species is related to *D. stipatum* which has a similar life-form, but is certainly distinct. *D. cheelii* has leaflets with veins prominently depressed on the upper surface of the leaflets, usually short leaf-rachises, usually narrower leaflets, shorter pedicels, bracts and bracteoles, and pods with fewer articles. The geographic ranges of the two species do not overlap.

4. Dendrolobium stipatum S.T. Blake, Austr. J. Bot. 2:117 t.2 (1954). **Type:** E mouth of Daly River, 13°23'S 130°32'E, July 1946, *S.T. Blake* 16670 (holo:BRI; iso:BRI, K).

Holtzea umbellata Schindl., Rep. sp. nov. reg. veg. 22:285 (1926). **Type:** N. Australia, in 1891, *M. Holtze* (iso:K).

Subshrub to c. 1 m high, tufted stems from perennial rootstock; branches with indumentum of moderately dense to dense appressed hairs 0.2–0.4 mm long; stipules triangular, 2–5.5 mm long, 2 mm wide at base, striate, pubescent outside. Leaves 1- or 3- foliolate; leaflets oblong, elliptic or ovate, obtuse or retuse, sparsely appressed pubescent on both surfaces, the hairs c. 0.2 mm long, 6–10 prominent lateral veins on each side of midrib; terminal leaflet 38–65 mm long, 17–45 mm wide, 1.8–2.3 times longer than wide, laterals smaller, 23–45 mm long, 11–20 mm wide, 1.7–2.3(–2.8) times longer than wide; rachis 1–12 mm long, petiolules 1.5–2.5 mm long, stipels about as long as the petiolules; petioles 4–14 mm long. Flowers in fascicules of up to c. 12 in the upper axils, sessile or on peduncles to 6 mm long; bracts 1–3 mm long; pedicels 6–16 mm long, bracteoles at base of calyx, 1–1.5 mm long. Flowers: calyx c. 4 mm long with ± appressed hairs c. 0.3 mm long and short erect uncinate hairs, tube 2–2.2 mm long; corolla pink, the standard whitish in the upper half, concave, oblong c. 10 mm long, 6 mm wide on claw c. 1 mm long; keel petals about as long as the wings; ovary appressed pubescent. Pods curved with

4–6 articles, each oblong, 6–8 mm long, 3.5–5 mm wide, appressed pubescent. Seeds not seen.

Other specimens**: Northern Territory.** Old Litchfield Road, 13°32'S 130°54'E, Sep 1975, *Dunlop* 3588 (DNA, K); Woodcutters track, 50 miles [80 km] S of Darwin, Sep 1970, *Byrnes* 1991 (DNA, K); Batchelor, Sep 1913, *Hill* 7023/13 (NSW).

Distribution and habitat**:** *Dendrolobium stipatum* is restricted to a small area in the north of the Northern Territory where it occurs on sandy soils in eucalypt woodland. Map 10.

Affinities**:** The species is closely related to *D. cheelii*; differences between them are discussed under the latter. Blake compared *D. stipatum* with *D. umbellatum* but acknowledged that it differed sharply from that species.

5. Dendrolobium umbellatum (L.) Benth. in Miquel, Pl. Jungh. 216 & 218 (1852); Miquel, Fl. Ind. Bat. 1:262 (1855); Ohashi, Ginkgoana 1:82 (1973); Pedley, Rev. Handb. Fl. Ceylon 10: 162 (1996); *Desmodium umbellatum* (L.) DC., Prodr. 2:325 (1825); Benth., Fl. Austr. 2:230 (1864); Prain J. Asiatic Soc. Bengal 66:387 (1897); Schubert, Fl. Trop. East Africa Legum.: Papilion.: 455 (1971); Lui & Chuang, Taiwania 8:98 (1962); *Hedysarum umbellatum* L., Sp. Pl.: 747 (1753). **Type:** Herb. Hermann vol. 2 fol. 26, No.293 (lecto: BM, *fide* Pedley in Turland & Jarvis (1997)).

Aeschynomene arborea L.,Sp. Pl.: 713 (1753). **Type**: Sri Lanka: N. of Trincomalie, 1 September 1931, *N.D. Simpson* 8516 (BM, neotype, *fide* Pedley in Turland & Jarvis (1997)).

Two varieties are recognised.

5a.Dendrolobium umbellatum (L.) Benth. var. **umbellatum**

Branches and pedicels with indumentum of silky appressed hairs, becoming sparse; leaflets ovate or elliptic, sparsely appressed pubescent beneath, the hairs minute; pods sparsely appressed pubescent.

Selected specimens**: Queensland.** COOK DISTRICT: Boigu Is., 9°14'S 142°13'E, Oct 1981, *Clarkson* 3870 (BRI, K, MBA); Endeavour River, Aug 1820, *Cunningham* 88 (BM, K); Barnard Is. (no 2), Jun 1848, *McGillivray*. Voy. of 'Rattlesnake' Bot. 284 (K); NORTH KENNEDY DISTRICT: Cardwell, c. 18°10'S 146°00'E, Aug 1963, *Blake* 22070 (BRI, K, MEL); Daydream (West Molle) Is, 20°15'S 148°49', Jun 1984, *Pedley* 5220 (BRI, MEL).

5b. Dendrolobium umbellatum var. **hirsutum** (DC.) Pedley, **comb. nov**. *Desmodium umbellatum* var *hirsutum* DC., Prodr. 2:325 (1925); *Dendrolobium umbellatum* f. *hirsutum* (DC.) Ohashi Ginkoana 1:84 (1973). Type: Calcutta Botanic Gardens, Wallich 5687D (iso:K)

Branches and pedicels densely hirsute; leaflets almost orbicular, densely hairy beneath; pods with ± persistent long yellowish hairs.

This variety does not occur in Australia.

Distribution and habitat**:** In Australia *D. umbellatum* var. *umbellatum* occurs along the east coast, north of about Mackay (22°S), usually on sand, often in dense stands above high-water mark, though sometimes on rocks or forming a fringe behind mangroves. It does not occur on the western shore of Cape York Peninsula nor farther west in the Northern Territory or Western Australia. Outside Australia, the variety extends into the Pacific (Melanesia as far east as Tonga, Samoa and Micronesia) and through Malesia to Taiwan, southern China, Indo-China, the Andaman Is., Peninsular India, Sri Lanka to east Africa. Map 11.

Dendrolobium umbellatum var. *hirsutum* is found in Madagascar and the Mascarene Islands. Ohashi in making the combination *Dendrolobium umbellatum* f. *hirsutum* cited only cultivated specimens and stated that its native habitat was unknown.

Affinities**:** *Dendrolobium umbellatum, D. arbuscula, D. quinquepetalum* and *D. triangulare* are closely related but their relationship to other species is uncertain. The wide geographic range of *D. umbellatum* could indicate it to be less advanced than the other species all of which (except for *D. triangulare* and possibly *D. quinquepetalum*) have restricted ranges and which may have been derived from it. Its occurrence on sea-shores and its thick-walled pod articles seemingly adapted to dispersal by water could, however, point to the wide distribution of the species regardless of its level of advancement.

Ohashi (1973:85) noted the great variability of *D. umbellatum* but could not find any distinctive local assemblages. However, he did distinguish *D. umbellatum* f. *hirsutum* (DC.) Ohashi, based on *Desmodium umbellatum* var. *hirsutum* DC., which was described from a plant grown in the Calcutta Botanic Gardens. *D. umbellatum* from Madagascar, Mauritius and Reunion is the same as *D. umbellatum* f. *hirsutum*. It has densely hirsute branches and pedicels, almost orbicular leaflets densely hairy and prominently veined on the lower surface, and pods with more or less persistent long yellowish hairs, and is distinct enough to warrant varietal rank.

6. Dendrolobium arbuscula (Domin) Ohashi, Taiwania 42:137 (1997).

Desmodium arbuscula Domin, Biblioth. Bot. 89:211 (1926). **Type:** Queensland. In xerodrymio ad Chillagoe, *Domin* '4764' (lecto: PR 527346, chosen here).

Dendrolobium sp. (Mt Scatterbrain J.R. Clarkson+ 6708) Pedley in Henderson (ed.): Queensland Plants: Names and Distribution: 79 (1997).

Shrub or small tree, in Australia up to 6 m tall but reported to reach 12.5 m in New Guinea (*Pullen* 6992; BRI, CANB, K); bark soft, grey; branchlets covered with rather dense appressed white hairs, occasionally somewhat retrorse, 0.3–0.5 mm long; stipules to 10 mm long, deciduous. Leaves 3-foliolate; leaflets oblong, elliptic or obovate, rounded or sometimes attenuate at the base, obtuse or subacute at the apex, margins tending to be slightly recurved, glabrous or with sparse appressed hairs on upper surface, sparse to moderately dense, appressed or slightly ascending hairs on the lower, c. 10 lateral veins prominent on each side of midrib; terminal leaflet 30–65 mm long, 16–32 mm wide, laterals smaller, 20–50 mm long, 9–17(–24) mm wide, both (1.4–)1.8–2.6 times longer than wide; stipules 1.5–4 mm long, usually about as long as petiolules, 1.5–3.5 mm long; rachis 5–9 mm long; petioles 9–16 mm long. Flowers in condensed, umbellate, axillary racemes, sessile or peduncle up to 8 mm long; bracts 3–4 mm long, pedicels c. 2 mm long, bracteoles 2.5–3.5 mm long. Flowers: calyx 5.5–8 mm long, tube c. 3 mm long, upper lobe shortly bifid at apex, 2.5–3.5 mm long, c. 1.5 mm wide at base, lateral lobes 3–3.2 mm long, lower lobe acuminate, 4.5–5 mm long, all c. 1 mm wide; corolla white, occasionally with a green area at the base of the standard; standard orbicular, 9–10 mm long (7–)8–11 mm wide on claw 1.5–2 mm long; wings (5.5–)9–11 mm long, (2–)3.3– mm wide, auriculate at the base, on a claw 1.5–2 mm long; keel slightly shorter than wing petals. Pods with 2 or 3 articles; articles oblong, 4–6 mm long, 3.5–4 mm wide with sparse appressed hairs 0.1–0.2 mm long. Seeds not seen.

***Selected specimens*: Papua New Guinea.** Between Dabora and Cape Vogel Peninsula, Apr 1953, *Brass* 21875 (K); vicinity of Rigo, Central District, Aug 1962, *Schodde* 2699 (CANB, K, L); Mori R., c. 15 km NE of Rodney, Central District, Aug 1969, *Pullen* 8132 (CANB, K, L). **Queensland.** COOK DISTRICT: 17 miles [27 km] SW of Coen, Aug 1966, *Story* 7927 (CANB, K); Chillagoe, alt. 360m, Jan 1931, *Hubbard & Winders* 6794 (BRI, K); 4-mile Creek, Alma-den, alt. 450m, 17°20S 144°35'E, Jan 1972, *Hyland* 5818 (BRI, K, QRS).

***Distribution and habitat*:** The species occurs on limestone outcrops, in dry rainforest and in eucalypt woodland often on margin of rainforest from c. 18°S lat. through Cape York Peninsula to Papua New Guinea in the vicinity of Port Moresby and eastward. It has also been recorded from Fiji (Ohashi 1997a). Map 12.

***Affinities*:** Despite its position close to *D. multiflorum* in the key to species, *D. arbuscula* is related not to *D. multiflorum* but to *D. umbellatum* and *D. quinquepetalum* (Blanco) Merr. Knaap-van Meeuwen (1962) referred four specimens (*Brass* 8789, *Carr* 11845, NGF 4225 from New Guinea and *Hubbard & Winders* 6794 from Queensland) with some doubt to *Desmodium quinquepetalum*. Verdcourt (1979: 411) accepted the New Guinean specimens cited by Knaap-van Meeuwen as mere variants of *Desmodium umbellatum*. Ohashi (1997a) pointed out differences between *D. arbuscula* and *Dendrolobium quinquepetalum* and referred all four specimens to *D. arbuscula*. NGF 4228 is not a good specimen and difficult to identify but I agree with Ohashi's placement of the other specimens.

D. arbuscula differs from *D. quinquepetalum* in leaflets not acuminate with veins not prominent beneath, both calyx and corolla somewhat smaller, the lower lobe of the calyx longer than the others by 1 mm or more, and small, less pubescent articles of the pod. From *D. umbellatum* it differs in its leaflets smaller, more coriaceous and tendency to shine on the upper surface, and, contrary to its protologue, wing petals longer than the keel and about as wide.

Though *D. quinquepetalum* has apparently been excluded from the flora of New Guinea, one specimen from the island (Laloki River, June 1926, Brass 1654 (BRI, K)) probably represents an undescribed species closely related to it.

Desmodium Desv., J. Bot. Agric. 1:122 t.5 (1813), nom. conserv.; Benth. in Miq., Pl. Jungh. 220 (1852); Hutchinson, Gen. Fl. Pl. 1:481 (1964); Ohashi, Ginkoana 1:87 (1973) – with synonyms listed, except *Holtzea* Schindler which is *Dendrolobium*; Smith, Fl. Viti. Nova 3: 188 (1985); Pedley, Rev. Handb. Fl. Ceylon 10:196 (1996). Type: *Desmodium scorpiurus* (Sw.) Desv.

Note: Most other published descriptions of *Desmodium* (for example, Schubert (1971), Verdcourt (1979)) are quite wide and include the genera *Aphyllodium, Dendrolobium, Phyllodium* and *Tadehagi* which are treated here as distinct.

A genus of some 300 species distributed mainly through the subtropics and tropics with perhaps half the species in Mesoamerica.

Bentham (1852, 1865b) is the only person to have published an infrageneric classification. He probably saw specimens of fewer than half the currently accepted species and these, because of a preponderance of specimens from British colonies, mainly from the Old World. Consequently his treatment of New World species is rather sketchy. Schindler, whose annotations of specimens and his publications from 1911 to 1928 suggest that his knowledge of the Desmodieae was unsurpassed, and who had a narrow concept of *Desmodium*, recognised the segregate genera of Bentham (1852), and described others. Some were recognised by Hutchinson (1964), Ohashi (1973) and Ohashi et al. (1981). Ohashi (1973) compared the different treatments.

Schindler never proposed a complete infrageneric classification of *Desmodium* and *Meibomia* which he treated as distinct genera, though he did recognise several subgenera and sections. Ohashi (1973) proposed a new classification of *Desmodium* and allied genera. His study was 'intended to delimit all the Asiatic species of the genus *Desmodium* and its allied genera as well as these genera themselves'. Since he considered less than a fifth of the total number of species of *Desmodium* over only part of its range, it might be expected that his classification would have only limited application. However, because south-eastern Asia is the centre of generic diversity (but not of speciation) of the Desmodiineae and has few species in common with the New World, Ohashi's classification can stand alone. Consideration of New World species would probably lead to the recognition of additional subgenera and sections rather than the modification of those already proposed; that is, a classification of American species could be added to Ohashi's classification with minor disturbance.

Ohashi treated only 14 Australian species, those that occur in Asia or Malesia as well, and his classification requires minor modification to accommodate all the Australian species. The classification is set out below. Four recently introduced American species, *D. incanum, D. intortum, D. tortuosum* and *D. uncinatum* have not been classified. Alterations to Ohashi's classification are:

1. Description of a new subgenus to accommodate *D. acanthocladum*.

Desmodium subg. **Acanthocladum** Pedley, **subg. nov.** Frutex; ramuli in spinis brevibus immutati; inflorescentia brevia usque 4 nodis constructa; bracteoleae et bractae primariae secundariaeque praesentae; legumen usque 7 articulis, aliquot plerumque abortis constructus, unusquisque c. 10 mm longis, 4–4.5 mm latis. **Typus:** *Desmodium acanthocladum* F. Muell.

Shrub; branchlets modified into short spines; inflorescence short with up to 4 nodes; primary and secondary bracts and bracteoles present; pod with up to 7 articles, some usually aborted, each c. 10 mm long, 4–4.5 mm wide.

2. Transfer of *Alysicarpus* sect. *Desmodiopsis Schindl.* to *Desmodium* (subg. *Sagotia*), with *Desmodium campylocaulon* F. Muell. ex Benth. the only species

Desmodium sect. **Desmodiopsis** (Schindl.) Pedley, **comb. nov.**

Alysicarpus sect. *Desmodiopsis* Schindl., Rep. sp. nov. reg. veg. 21:14 (1925). **Type:** *Desmodium campylocaulon* F. Muell. ex Benth. (*Alysicarpus campylocaulos* (F. Muell. ex Benth.) Schindl.).

3. Recognition of (a) ser. *Stenostachys* and (b) ser. *Arillata*, both sufficiently distinct from the type of sect. *Sagotia*, *D. triflorum*, to warrant acceptance

a. Desmodium ser. **Stenostachys** (Schindl.) Pedley, **stat. nov.**

Desmodium sect. *Stenostachys* Schindl., Rep. sp. nov. reg. veg. 22:255 (1926). **Lectotype:** *Desmodium filiforme* Zoll. & Moritzi

Annual herbs; leaves 1- or 3-foliolate, often on same plant; leaflets dimorphic; inflorescences long, sparsiflorous, terminal and/or axillary; flowers single, or rarely in pairs along the rachis; secondary bracts and bracteoles absent; pods with upper suture continuous or notched between articles; seed with small rim aril only.

b. Desmodium ser. **Arillata** Pedley, **ser. nov.** Herbae perennes; folia 1- et 3- foliolata, rhachide saepe petiolo longiore; inflorescentia terminalia, plerumque 3–10-flora, compacta, saepe in frondibus tecta; legumen suture supera undulata, inferna crenata praeditum, ita inter articulos constrictum; semen arillo bene evoluto simili eiei *Codariocalycis motorii* (Houtt.) Ohashi ornatum. **Typus:** *Desmodium microphyllum* (Thunb.) DC.

Perennial herbs; leaves 1- and 3-foliolate, rachis often longer than the petiole; inflorescence terminal, usually 3–10-flowered, compact, often hidden in foliage; upper suture of pod undulate, lower crenate, hence pod constricted between articles; seeds with well developed aril similar to that of *Codariocalyx motorius* (Houtt.) Ohashi.

4. Recognition of *Sagotia* at the rank of series

Desmodium ser. **Sagotia** (Duchass. & Walpers) Pedley, **comb. et stat. nov.**

Sagotia Duchass. & Walpers, Linnaea 23:737 (1850).

Perennial herb; leaves 3-foliolate; inflorescence an axillary or usually a leaf-opposed 2–5 flowered fascicle, sometimes fascicles arranged in short racemes; upper suture of pod continuous; seed with small rim aril only. **Type:** *Desmodium triflorum* (L.) DC. (*Sagotia triflora* (L.) Duchass. & Walpers).

Systematic arrangement of *Desmodium* Desv. in Australia.

subg. *Hanslia* (Schindl.) Ohashi

1. *D. ormocarpoides* DC

subg. *Acanthocladum* Pedley

2. *D. acanthocladum* F. Muell.

subg. *Desmodium*

3. *D. scorpiurus* (Sw.) Desv.

subg. *Sagotia* (Duchass. & Walpers) Baker

sect. *Oxytes* (Schindl.) Ohashi

4. *D. brachypodum* A. Gray

sect. *Desmodiopsis* (Schindl.) Pedley

5. *D. campylocaulon* F. Muell. ex Benth.

sect. *Sagotia* (Duchass. & Walpers.) Benth.

ser. *Arillata* Pedley

6. *D. microphyllum* (Thunb.) DC.

ser. *Sagotia* (Duchass. & Walpers) Pedley

7. *D. triflorum* (L.) DC.
8. *D. heterophyllum* (Willd.) DC.

ser. *Stenostachys* (Schindl.) Pedley

9. *D. pycnotrichum* Pedley
10. *D. trichostachyum* Benth.
11. *D. filiforme* Zoll. & Moritzi
12. *D. brownii* Schindl.
13. *D. flagellare* Benth.
14. *D. hannii* Schindl.
15. *D. muelleri* Benth.
16. *D. glareosum* Pedley
17. *D. pullenii* Pedley

sect. *Nicolsonia* (DC.) Benth.

18. *D. heterocarpon* (L.) DC.
19. *D. strigillosum* Schindl.
20. *D. nemorosum* F. Muell. ex Benth.
21. *D. tiwiense* Pedley

sect. *Heteroloma* Benth

22. *D. velutinum* (Willd.) DC.
23. *D. gangeticum* (L.) DC.
24. *D. rhytidophyllum* F.Muell. ex Benth.
25. *D. tenax* Schindl.
26. *D. macrocarpum* Domin
27. *D. gunnii* Benth. ex J.D. Hook.
28. *D. varians* (Labill.). D. Don

Introduced American species, position not defined:

29. *D. tortuosum* (Sw.) DC.
30. *D. uncinatum* (Jacq.) DC.
31. *D. intortum* (Mill.) Urban
32. *D. incanum* DC.

Key to species of *Desmodium* in Australia

1. Disk around base of ovary; stigma lateral; articles of pod 17–20 mm long; scandent shrubs . . . . **1. D. ormocarpoides**
   Disk absent; stigma terminal; articles of pod less than 12 mm long; herbs or shrubs, not scandent 2

2. Woody shrub with spinescent branches; inflorescences axillary, up to 12 mm long with up to 4 fascicles of flowers; bracteoles present; pods of 4–6 articles, each 9–11 × 4–4.5 mm, some usually aborted . . . . **2. D. acanthocladum**
   Herbs or shrubs, not spinescent; inflorescences terminal or axillary, usually longer; bracteoles absent; articles usually smaller, not significantly aborted 3

3. Stipules persistent, distinctly auriculate at the base on the side further away from the petiole 4
   Stipules persistent or not, mostly symmetrical at the base, or if asymmetric then not auriculate 6

4. Erect annual; young pods twisted; mature articles with margins alternately involute and revolute . . . . **29. D. tortuosum**

Sprawling or prostrate perennial herb; young pods not twisted, mature articles with plane margins 5

5. Leaves drying blue-black, sometimes with 5 leaflets; pod-articles semicircular, 4 × 3 mm .... **3.D. brachypodum**
Leaves not drying blue-black, 3-foliolate; pod articles narrowly oblong elliptic, 4–5 × 1–2 mm .... **4. D. scorpiurus**

6. Flowers large: calyx 6 mm or more long, lowest lobe c. 5 mm long; standard c. 1cm long; pod shortly stipitate; stamens monadelphous, the upper stamen separating as pods develop 7
Flowers smaller: calyx less than 6 mm long, lobes less than 5 mm long; standard to c. 8 mm long; pod sessile; stamens diadelphous 8

7. Pod articles 5 × 3 mm; leaflets often with pale central zone along midrib .... **30. D. uncinatum**
Pod articles 4 × 2 mm; leaflets uniformly green above .... **31. D intortum**

8. Pod articles inflated; leaves lanceolate to narrow ovate, 4–7 (–11) cm long, 4–7.5(–10) times longer than wide .... **5. D. campylocaulon**
Pod articles flat; leaves smaller and/or less elongate 9

9. Upper calyx lobes connate at their base, united up to about half their length, hence calyx subequally 5-lobed; inflorescences open; pedicels often more than 5 mm long, filiform; secondary bracts absent; plants herbaceous 10
Upper calyx lobe entire or bifid but not divided beyond the middle, hence, calyx 4-lobed; inflorescence often dense; pedicels often less than 5 mm long; secondary bracts often present; plants herbaceous or woody 21

10. Flowers in few-flowered axillary or leaf-opposed fascicles or in short 3–10-flowered terminal inflorescences, the inflorescences obscured by foliage 11
Flowers single (rarely in pairs) in open terminal inflorescence projecting from foliage. 13

11. Inflorescence terminal; lateral leaflets 2.5–6 × 1.2–2.2 mm, usually 2–3 times longer than wide; both upper and lower sutures of pod incised; seed with well developed aril .... **6. D. microphyllum**
Flowers in axillary or leaf-opposed fascicles; lateral leaflets more than 3 mm wide and less than 3 times longer than wide; upper suture of pod straight; seed with rim aril only 12

12. Terminal leaflet cuneiform, 4–7.5 mm long; pedicels 5–8 mm long .... **7. D. triflorum**
Terminal leaflet elliptic or obovate, 10–27 mm long; pedicels 10–20 mm long .... **8. D. heterophyllum**

13. Upper suture of pod distinctly notched between articles; nerves of articles anastomosing, radiating from raised central area where anastomoses are small and ± equilateral; nerves often purplish 14
Upper suture of pod continuous, not distinctly notched between articles; nerves of articles ± transverse, anastomoses ± elongate not radiating from central raised area; nerves not purplish 17

14. Leaves 1- and/or 3-foliolate; leaflets depressed ovate, orbicular or cuneiform 15
    Leaves usually 3-foliolate, terminal leaflet obovate, oblong or linear 16

15. Leaves 3-foliolate; leaflets cuneiform; ovary and articles (at least when young) with clavate trichomes .... **9. D. pycnotrichum**
    Leaves 1- and/or 3-foliolate; leaflets cuneiform, depressed ovate or orbicular; ovary and pod glabrous or with sparse uncinate hairs . **10. D. trichostachyum**

16. Terminal leaflet oblong, 10–35(–45) mm long, usually more than 3.5 mm wide, 1–5(–7) times longer than wide; rachis of inflorescence usually with long spreading hairs; plant prostrate .... **11. D. filiforme**
    Terminal leaflet linear, narrow lanceolate or narrow oblong, 10–50(–65) mm long, usually less than 4 mm wide, 3.5–13 times longer than wide; rachis (at least in upper part) without long spreading hairs; plant erect... **12. D. brownii**

17. Pods with 2 (or 3) articles; articles 4.2–5 mm long; leaves usually 3-foliolate; terminal leaflet oblong or obovate, 12–40 × 10–24 mm, 1.1–1.7 times longer than wide .... **13. D. flagellare**
    Pods with 4–6 articles; articles 2.5–4.2(rarely –5 mm) long; leaves 1- or 3-foliolate; largest leaflet shorter, narrow or more elongate 18

18. Pod distinctly curved; articles (2.5–)2.8–4.2(–5) mm long; leaflets orbicular (when 1-foliolate) or obovate or cuneiform (when 3-foliolate), usually less than 1.5 times longer than wide .... **14. D. hannii**
    Pods straight; articles sometimes shorter; terminal (or single) leaflet oblong, obovate-oblong, usually 1.5–4.5 or more times longer than wide 19

19. Articles (3.5–)4–5 × 3–4 mm; largest leaflet of leaf widest below the middle, glabrous, or almost so, on upper side .... **15. D. muelleri**
    Articles 2.5–3.5 × 2.2–3.3 mm; largest leaflet oblong or obovate, not widest below the middle, usually pubescent on upper surface 20

20. Hairs of upper surface of leaf usually weak, ascending; of stems usually weak and ascending, white, up to 1 mm long; largest leaflet usually less than 5 mm wide .... **16. D. glareosum**
    Hairs of upper surface of leaflets appressed, occasionally somewhat ascending; of stem stiff, yellow, curved ascending; largest leaflet usually more than 5 mm wide .... **17. D. pullenii**

21. Leaves on individual plants predominantly 1-foliolate, occasionally with a few 3-foliolate leaves 22
    Leaves on individual plants predominantly 3-foliolate, sometimes, particularly on young plants, mixed with 1-foliolate leaves 25

22. Leaflet broadly ovate, 6–12.5 × 4–8.5(–10.5) cm, lower surface velutinous, upper surface pubescent .... **22. D. velutinum**
    Leaflet oblong, elliptic, ovate or orbicular, 1.7–8.5 (rarely –16) × 1–6(–8.5) cm, glabrous or almost so on upper surface, appressed pubescent on lower surface 23

23. Leaflet elliptic to ovate, acutish; secondary bracts present; pod deeply incised; articles 2.5–3 × 2–2.5 mm; pedicels to 4 mm long .... **23. D. gangeticum**
    Leaflet oblong, elliptic or orbicular, obtuse; secondary bracts absent; pods

shallowly incised, articles 3 mm or more long and wide; pedicels 2–3 mm long 24

24. Leaflet more or less orbicular, subcordate at base; pod-articles 3–3.5 × 3–3.5 mm .... **21. D. tiwiense**
Leaflet oblong-elliptic,rounded at base; pod articles c. 5 × 3.5 mm .... **20. D. nemorosum**

25. Primary bracts dense and entirely covering flower buds, the young inflorescence therefore like coniferous strobiles; upper suture of pod straight or slightly undulate, lower shallowly constricted, hence isthmus usually more than half width of pod.......... 26
Primary bracts usually triangular or narrowly ovate, not entirely covering flower buds; upper suture of pod undulate to distinctly incised, lower suture deeply constricted, hence isthmus usually less than half width of pod 28

26. Inflorescence open when mature; pedicels spreading or decurved in fruit; pod-articles c. 5 × 3.5 mm .... **20. D. nemorosum**
Inflorescence dense when mature; pods erect, ascending or deflexed, often obscuring rachis; pod articles 2.5–3 × 1.8–3 mm 27

27. Pods erect or ascending; terminal leaflet obovate, sometimes narrow; axis of inflorescence either with rather spreading uncinate hairs or with stiff yellowish appressed hairs .... **18. D. heterocarpon**
Pods deflexed; terminal leaflet lanceolate to oblong; axis of inflorescence shortly appressed pilose .... **19. D. strigillosum**

28. Plants rather densely pubescent; branchlets and at least undersides of leaves with spreading hairs 29
Plants not densely pubescent; branchlets and undersides of leaves glabrous or with sparse appressed hairs.......... 32

29. Stipules 3–11mm long, united at base, at least when young............ **32. D. incanum**
Stipules to c. 6 mm long, free.......... 30

30. Terminal leaflet to 60 mm long; articles of pod 3.5–4 × 2.5–3 mm; trailing or sprawling plant .... **24. D. rhytidophyllum**
Terminal leaflet more than 60 mm long; articles of fruit more than 5 mm long, ± erect plants 31

31. Leaflets ovate with long acute apex; upper surface with sparse appressed to ascending hairs; articles 5.5–8 × 3.4–4 mm .... **25. D. tenax**
Leaflets ovate or rhombic, obtuse, mucronulate, with moderately dense stiff hairs on both surfaces; articles 9–10 × 5–6 mm .... **26. D. macrocarpum**

32. Leaves subdigitate; leaflets cuneiform and truncate at the apex or rarely broadly obovate and rounded; pod articles 4–5 × 2–2.5 mm .... **27. D. gunnii**
Leaves usually with distinct rachis 2–4.5 mm long; leaflets lanceolate, oblong or rarely oblanceolate; pod articles 3.5–4.2 × 2.7–3.8 mm ...... **28. D. varians**

1. Desmodium ormocarpoides DC., Prodr. 2:327 (1825); Desvaux, Mém. Soc. Linn., Paris 4:307 (1825); Ohashi, Ginkgoana 1:113 (1973); Verdcourt, Man. New Guinea Leg: 403 (1979). Based on *Hedysarum adhaerens* Poir., in Lamarck, Encycl. Méth. Suppl 5:15 (1817), nom illeg., non Vahl (1791); *Hanslia adhaerens* (Poir.) Schindl., Rep. sp. nov. reg. veg. 20:277 (1924) **Type:** 'Cette plante a été découverte à l'île de Java par M. de Labillardière' (P?, n.v.)

Desmodium dependens Blume ex Miq., Fl. Ind. Bat. 1:248 (1855). **Type:** Molukscheeilanden. Nieuw Guinea' (n.v.)

***Selected specimens*: Queensland.** Cook District: Alligator Creek Catchment, 12°35'S 143°20'E, Oct 1972, *Hyland 6440* (BRI, K); Shiptons Flat, 15°48'S 145°14'E, Oct 1973, *Webb & Tracey 13643* (BRI, CANB). North Kennedy District: Rockingham Bay, *Dallachy* (MEL); Port Denison, in 1874, *Fitzalan* (MEL).

Distribution and habitat: The species occurs in rainforest, usually in disturbed situations such as along logging tracks. It ranges from the central Queensland coast through New Guinea to central Malesia. It is not common in Australia. Map 13.

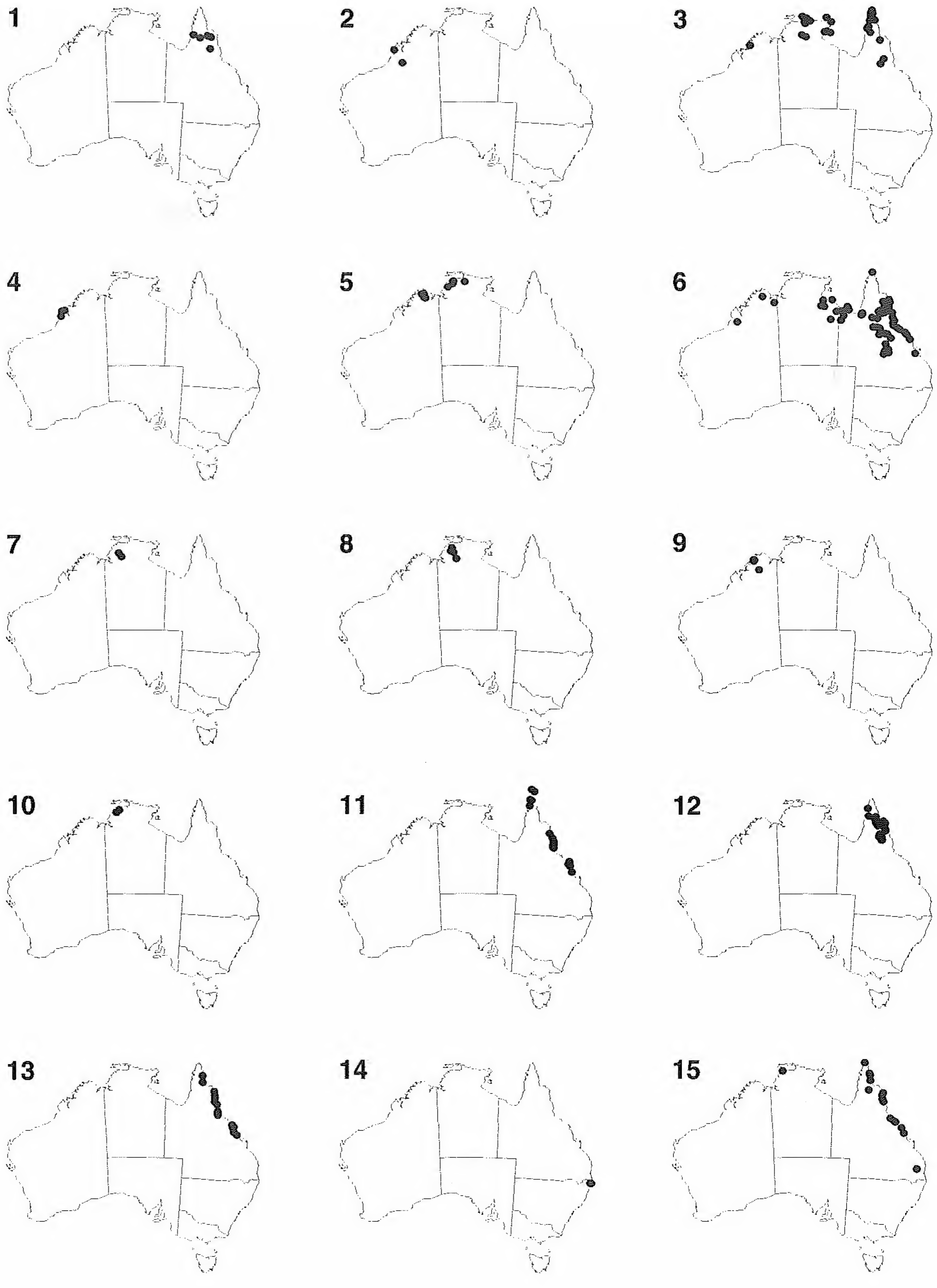
Affinities: *D. ormocarpoides* is a well defined species isolated in the genus. Schindler referred it to his monospecific genus *Hanslia* which Ohashi reduced to subgeneric rank within *Desmodium*. It is characterised by its stipitate pods composed of slightly turgid, narrowly obovate articles, the minute tubular disk around the base of the ovary, the lateral stigma and the bracteoles at the base of the calyx.

2. Desmodium acanthocladum F. Muell., Fragm. Phytog. Austr. 2:122 (1861); Benth., Fl. Austr. 2:23 (1864); C. Muell. in Walpers, Ann. Bot. 7:764 (1870); Steen. & Veldk., Reinwardtia 10:24 (1982); *Dicerma acanthocladum* F. Muell., loc. cit., pro. syn; *Meibomia acanthoclada* (F. Muell.) Kuntze; Rev. Gen. 1:197 (1891). **Type**: Clarence River, *Beckler* (holo: MEL; iso: K).

Woody shrub to 2 m tall; branchlets (many modified into short thorns) angular with yellowish ribs running from the bases of stipules, glabrous; stipules deltoid, 1–2 mm long, veined. Leaves trifoliolate, coriaceous; petioles sulcate, 1–4 mm long; rachis 0.6–2.3 mm long; petiolules 0.3–0.5 mm long; stipels setaceous, about as long as the petiolules; terminal leaflet oblanceolate and obtuse or narrowly elliptic and acute, the laterals oblong or obovate, acute or obtuse, all glabrous and slightly shining above or with scattered short hairs and paler beneath, the terminal ones 12–28 mm long, 3–5.5 mm wide, 3–6 times longer than wide; laterals smaller, 7–18.5 mm long, 3–5 mm wide, 2–3.6 times longer than wide. Flowers pink or mauve in fascicles of 2 or 3 along an axillary axis, up to 4-noded and 12 mm long; primary bracts c. 1 mm long, secondary bracts similar, shorter; pedicels 2–3 mm long with bracteoles 0.6–1 mm long at top of pedicel; calyx campanulate, 4-lobed, 3–4 mm long with scattered appressed hairs, the upper lip notched at the tip, 1.8–2 mm long, the lateral and lower ones apiculate with thickened tips, 1–1.3 mm long. Corolla longer than the calyx: keel orbicular, shortly clawed, 6.5–7 mm long, 6–7 mm wide; wings oblong, obtuse 7–8 mm long, 2.3–3 mm wide, auriculate at the base, on a claw 1.5–2 mm long, keel petals 6.5–8 mm long, 2.3–3 mm wide, auriculate on claw 2–2.5 mm long; stamens diadelphous; ovary minutely uncinate-hairy. Pods with 2–6 (7) articles, some usually aborted and occasionally appearing stipitate when the proximal article is aborted, upper suture shallowly indented, the lower margin deeply indented, the isthmus c. $^{1}/_{6}$ width of pod. Articles ± reticulately longitudinally veined, with moderate indumentum of hooked hairs, 9–11 mm long, 4–4.5 mm wide; seeds obliquely oblong, c. 6 mm long, 3.5 mm wide, rim aril small.

***Selected specimens*: New South Wales.** North Coast: Boat Harbour Flora Reserve, 17 km NE of Lismore railway station, 28°47'S 153°30'E, Feb 1989, *Coveny* 10651 (K, NSW); Wilsons River at Lismore, 28°48'S 153°17½'E, Feb 1987, *Pullen* 11139 (BRI, K, NSW).

Distribution and habitat: The species is confined to the North Coast division of New South Wales where it occurs on the fringes of riverine rainforest. It was probably more widely distributed before extensive clearing of the land, but apparently viable populations occur in flora reserves. Map 14.



1. *Aphyllodium latifolium*
2. *Aphyllodium parvifolium*
3. *Aphyllodium schindleri*
4. *Aphyllodium glossocarpum*
5. *Aphyllodium stylosanthoides*
6. *Aphyllodium biarticulatum*
7. *Dendrolobium multiflorum*
8. *Dendrolobium polyneurum*
9. *Dendrolobium cheelii*
10. *Dendrolobium stipatum*
11. *Dendrolobium umbellatum*
12. *Dendrolobium arbuscula*
13. *Desmodium ormocarpoides*
14. *Desmodium ancanthocladum*
15. *Desmodium scorpiurus*

Affinities: The relationships of the species are uncertain. Bentham (1864) dismissed Mueller's association of it with *Desmodium biarticulatum* (L.) F. Muell. (= *Aphyllodium biarticulatum*) and stated 'it is otherwise more nearly allied to the section *Heteroloma* subsect. *Podocarpa*'. Ohashi (1973) referred most species of subsect. *Podocarpa* to subg. *Podocarpium* (Benth.) Ohashi. *D. acanthocladum* differs from species of subg. *Podocarpium* in its woody habit, thorny branchlets, short axillary inflorescences, bracteoles and diadelphous stamens. This combination of characters excludes it from other subgenera treated by Ohashi, and it has therefore been placed in the newly described, monotypic subg. *Acanthocladum* (see p. 225).

Its resemblance to *Trifidocanthus unifoliolatus* Merr.(*Desmodium unifoliolatum* (Merr.) Steen.) is due mainly to its 'eco-taxonomical character' (Steenis & Veldkamp, 1982), its thorns. Otherwise it is not related to the other species.

3. **Desmodium scorpiurus** (Sw.) Desv., J. Bot. Agric. 1:122 (1813); Schubert, in McBride, Field Mus. Nat. Hist. Publ. Ser. 13 (3,1):433 (1943); Verdcourt, Man. New Guinea Leg: 407 t.94 (g) (1979); Howard, Fl. Lesser Antill., Leeward & Windward Is. 4(1):482 (1988); Smith Fl. Vitiensis Nova 3:190 (1985); *Hedysarum scorpiurus* Swartz, Nov. Gen. & Sp. Prodr.:107 (1788). **Type:** Jamaica, *Swartz* (S, *fide* Howard, n.v.)

Selected specimens: **Western Australia.** Port Hedland, *Runich* s.n. (PERTH). **Northern Territory.** Darwin, Oct 1971, *Pickering* s.n. (DNA, K). **Queensland.** COOK DISTRICT: Thursday Is., Oct 1981, *Clarkson* 3817 (BRI, DNA, CANB, K); S of Port Douglas, 16°30'S 145°27'E, Feb 1974, *Gibbs* s.n. (CANB). Hyde Park, Townsville, Feb 1990, *Jobson* 1084, (AD, BRI, CANB, HO, MEL).

Distribution and habitat: The species is native to tropical America, the West Indies and Mexico southward to Peru. It was introduced into Australia as a potential fodder plant and is now naturalised in a few places in the tropical part of the country. It favours open situations on well drained soils, particularly behind coastal dunes. Map 15.

4. **Desmodium brachypodum** A. Gray in U.S. Expl. Exped. 434 (1854); Benth., Fl. Austr. 2:232 (1864); Ohashi, Ginkgoana 1:227 (1973); Verdcourt, Man. New Guinea Leg.:394 (1979). **Type:** Hunter River, *U.S. Explor. Exped.* (n.v.)

   D. indigotinum Harms. & K. Schum. in K. Schum. & Laut, Nachr. Fl. Deutsch, Schutz geb. Südsee Nachtr.: 276 (1905). **Type:** Kaiser Wilhelmsland: Finschhafen *Wieland* s.n. (n.v.)

Selected specimens: **Northern Territory.** Nimbuwa Rock, 12°11'S 133°21'E, Jun 1974. *Pullen* 9502 (CANB). **Queensland.** LEICHHARDT DISTRICT: West of Moura, 24°34'S 149°39'E, Apr 1961, *Jones* (CANB); BURNETT DISTRICT: Monto, 24°52'S 151°07'E, Jun 1937, *Regan* (BRI); DARLING DOWNS DISTRICT: Canal Creek, in 1880, *Hartmann* 712 (MEL). **New South Wales.** 3 miles [5 km] from Tent Hill on Torrington road, Nov 1973, *Rodd* 2540 (NSW); Albion Park, Apr 1968, *McBarron* 4617 (NSW); Mt Kaputar National Park, 31 km ENE of Narrabri, Nov 1967, *Coveny* 8916 & Roy (K, NSW). **Victoria.** East Gippsland, Little River track, Mar 1971, *Beauglehole* ACB 37153 (MEL).

Distribution and habitat: The species is widely spread in eastern Australia from Gippsland, Victoria through coastal and subcoastal parts of New South Wales and Queensland to Cape York Peninsula, often in hilly country on sandy or loamy soils in eucalypt communities. It extends to the Northern Territory (two specimens seen) and eastern New Guinea. *Desmodium brachypodon*, *D. rhytidophyllum* and *D. varians* are the most frequently encountered species of *Desmodium* in eastern Australia. Map 16.

Affinities: Schindler (1926) described *Desmodium* subg. *Oxytes* to accommodate *D. brachypodum* and two New Caledonian species, *D. deplanchei* Harms and *D. pycnostachyum* Benth. Ohashi (1973) reduced this to sectional rank in subg. *Sagotia* with *D. brachypodum* as lectotype.

5. **Desmodium campylocaulon** F. Muell. ex Benth., Fl. Austr. 2:233 (1864); *Meibomia campylocaulon* (F. Muell. ex Benth.) Kuntze, Rev. Gen. 1:197 (1891) ('campylocaulis'); *Alysicarpus campylocaulos* (F. Muell.) Schindl., Rep. sp. nov. reg. veg. 21:14 (1925). **Type:** Sturts Creek, March 1856, *F. Mueller* (holo:K).

Prostrate or somewhat ascending perennial herb; branches with indumentum of short erect uncinate hairs when young, becoming sparse or absent when old; stipules rather stout, triangular, striate, 3–8 mm long, 1.5–3 mm wide at base. Leaves 3-foliolate; petioles (20–)30–70 mm long, rachis 3–11 mm long; leaflets lanceolate to (rarely) ovate, acute or obtuse and mucronulate at the apex, attenuate at the base, glabrous above with sparse hairs usually on veins beneath; terminal leaflet 40–70(–110) mm long, 6.5–15 mm wide, 3–7(–10.5) times longer than wide, the laterals shorter, 30–60(–100) mm long. Inflorescences terminal or rarely leaf-opposed, to 20 cm long, rachis with indumentum of spreading uncinate hairs c. 0.2 mm long, dense, becoming sparse as inflorescence elongates; flowers in pairs subtended by persistent oval-acuminate glabrous bract, 3–4 mm long; secondary bract and bracteoles absent; pedicels 2–4(rarely 5) mm long at anthesis, doubling in length in fruit. Flowers: calyx 4-merous, 2.5–3.5 mm long, with scattered straight hairs; tube 1–1.5 mm long, lobes 1.5–2 mm long, the upper bifid; corolla pink to pale purple; standard obovate, 3.5 mm long, 2–3 mm wide; wings 3.8–4 mm long, 1 mm wide; keel petals 4.3–4.8 mm long, 1–1.5 mm wide; stamens diadelphous; ovary pubescent. Pod straight, with upper suture thickened, the lower deeply indented; with 5–7 articles, each inflated, indehiscent, (2.5–)3–4 mm long, 2.2–3.3 mm wide, reticulately veined, with spreading uncinate hairs. Seeds oblongoid, 2.2–2.8 mm long, 1.5–2 mm wide, c. 1 mm thick, the hilum ecentrically placed on the long side, rim aril small.

***Selected specimens*:** **Western Australia.** 40 km SE of Fitzroy Crossing, 18°28'S 125°45'E, May 1988, *Pullen* 11197 (CANB). **Northern Territory.** 30 miles [48 km] E of 'Alexandria' Station, Jun 1948, *Perry* 1507 (BRI, CANB, K); 25½ [41 km] W of 'Rockhampton Downs', Jun 1960, *Chippendale* NT 7118 (DNA, K, MEL) **Queensland.** SOUTH KENNEDY DISTRICT: 2 miles [3 km] NE of 'Natal Downs' Station, 21°04'S 146°08'E, Jul 1964, *Adams* 1147 (BRI, CANB, K); WARREGO DISTRICT: Gilruth Plains, Cunnamulla, 28°04'S 145°41' E, Apr 1963, *McKee* 10311 (BRI, CANB, K).

***Distribution and habitat*:** *Desmodium campylocaulon* extends from the northern part of Western Australia through the north-central part of the Northern Territory into inland southern Queensland. It is confined to clay soils, usually in grassland with *Astrebla* spp. and *Iseilema* spp. Map 17.

***Affinities*:** As sole member of sect. *Desmodiopsis* (see above, p.226) *D. campylocaulon* has no close relative, though in habit, general appearance and ecology it resembles *D. muelleri* (sect. *Sagotia*). In his description of *D. campylocaulon*, Bentham described the pod-articles as 'membranous turgid or almost inflated when ripe'. Such a description is misleading. The pods are, in fact, markedly inflated and unlike the pods of any other Desmodieae. Presumably because of these inflated articles, Schindler transferred the species to *Alysicarpus*, describing a new section *Desmodiopsis* to accommodate it. *Alysicarpus* has turgid pods which are symmetrical: that is, their upper and lower margins are equally indented. They are also less membranous. The calyx of *Alysicarpus* is scarious with complex venation, unlike that of *D. campylocaulon*. As generally understood *Alysicarpus* is an easily recognised, nicely circumscribed, homogeneous genus. The addition of *D. campylocaulon* to it, even in a distinct section, obscures the present clear generic limits without doing anything to clarify the already rather indistinct limits of *Desmodium*. Prain (1897), commenting on Baker's (1876) transfer of *Alysicarpus parviflorus* Dalzell and other species to *Desmodium*, and concerned that it would not fit well in that genus, stated: 'Compromises in taxonomy are necessary, indeed the systematic arrangement of the species is essentially the art of happy compromise, but an arrangement which places one half of a natural group of forms in one genus, the other half in a second, strains unduly the privileges that the art of compromise allows'. Prain's principle still applies. *Alysicarpus parviflorus* and related trifoliolate species are now referred to *Desmondiastrum* A. Pramanik & Thoth. (Pramanik & Thothathri 1986). Rather than to complicate *Alysicarpus* which, despite comments to the contrary by Prain (*op. cit.*) and Meeuwen (1962), is quite distinct from *Desmodium*, I have treated *D. campylocaulon* as the only member of a section of *Desmodium*. No other genus of Desmodieae has inflated pod articles. The pods of *Pycnospora*, which is conventionally, though possibly wrongly, placed in the tribe are inflated but are 7–10 seeded, not segmented, and are not analogous to those of *D. campylocaulon*.

6. Desmodium microphyllum (Thunb. ex Murray) DC., Prodr. 2:337 (1825); van Meeuwen, Reinwardtia 6:254 (1962); Ohashi, Ginkgoana 1:241 (1973) & Fl. Camb. Laos Vietn. 27:105 (1994); Verdcourt, Man. New Guinea Leg. 402 (1979); Pedley, Rev. Handb. Fl. Ceylon 10:176 (1996); *Meibomia microphylla* (Thunb.) Kunze, Rev. Gen. 1:198 (1891); *Hedysarum microphyllum* Thunb. ex Murray, Syst. Veg. ed. 14:675 (1785), Fl. Jap. 284 (1784); Poir. in Lam, Encycl. Method. Bot. 6:417 (1804). **Type:** from Japan (n.v.)

Desmodium parvifolium DC., Ann. Sci. Nat. 4:100 (1825) & Prodr. 2:234 (1825); Wright & Arn., Prodr. Fl. Ind. Orient. 229 (1834); Benth., Fl. Austral. 2: (1864). **Type**: Nepal, in 1821, *Wallich* 5700 (iso:K).

Selected specimens: **Queensland.** North Kennedy District: Rockingham Bay, *Dallachy* (MEL, NSW); Port Curtis District: Port Clinton, 22°38'S 150°42'E, *Clarkson & Stanley* 855 (BRI, CANB); Moreton District: Mor(e)ton Bay, *Mueller* (K, MEL). **New South Wales.** Richmond River, *Moore* (K).

Distribution and habitat: *Desmodium microphyllum* is not a common plant in Australia. It has been collected in coastal areas from about Cairns south to the Richmond River, but little is known about its ecological requirements. It does occur in eucalypt open-forests and is evidently native. The species has a huge latitudinal range, extending through Malesia to south-eastern Asia and China and Japan. Specimens collected near the type locality, Nagasaki (*Maximowicz* in 1863, *Oldham* in 1862, K) leave no doubt that the Australian and the east Asian plants represent the same species. Map 18.

Affinities: Bentham (1852) placed *D. microphyllum* (as *D. parvifolium*) in sect. *Sagotia* with *D. triflorum* and *D. heterophyllum*, and it does have affinities with these species. However, its pod incised along the upper suture (not notched between articles) and, more importantly, the well developed aril set it apart from *D. triflorum*, *D. heterophyllum* and the other species I have referred to sect. *Sagotia*. I have therefore treated it as the single species of ser. *Arillata*. The well developed aril suggests a relationship with *Codariocalyx*, but other attributes do not support such a relationship.

7. Desmodium triflorum (L.) DC., Prodr. 2:334 (1825); Liu & Chang, Taiwania 8:96 t.22 (1962); Schubert, J. Arnold Arb. 44: 293 (1963) & Fl. Trop. East Africa: Legum. Papilion. 459 (1971); Ohashi, Ginkgoana 1:245 (1973) & Fl. Camb. Laos Vietn. 27:11 (1994); Verdcourt, Kirkia 9:512 (1974) & Man. New Guinea Leg. 409 (1979); Du Puy, Fl. Austral. 50:314 (1993); Pedley, Rev. Handb. Fl. Ceylon 10:178 (1996); *Sagotia triflora*(L.) Duchass. & Walpers, Linnaea 23:738 (1850); *Meibomia triflora* (L.) Kuntze, Rev. Gen. 1:197 (1891) (incl. vars.); *Hedysarum triflorum* L., Sp. Pl. 749 (1753). **Type:** Herb. Hermann vol. 1 fol.21, No.297 (BM, lectotype *fide* Pedley in Turland & Jarvis (1997).

Selected specimens: **Northern Territory.** Palmerston, 12°29'S 130°59'E, May 1992, *Cowie* 3017 (BRI, DNA). **Queensland.** Cook District: Mareeba, Apr 1983, *Clarkson* 4587 (BRI, K); North Kennedy District: Tully & vicinity, Jan 1950, *Clemens* (ex herb. Univ. Michigan) (BRI, K); Wide Bay District: Bundaberg, Apr 1936, *Blake* 11253 (BRI, CANB, K, MEXU); Moreton District: Bribie Is., May 1930, *Hubbard* 2667 (BRI,K).

Distribution and habitat: This species is distributed through the tropics and subtropics. It occurs in open spaces, on roadsides and is often a weed of lawns, usually on well drained soils. In Australia it occurs in the extreme north of the Northern Territory and along the east coast north from about Brisbane. It is so well established in south-eastern Queensland that it is hardly conceivable that it does not extend into New South Wales, but I have seen no specimens. Map 19.

Affinities: *Desmodium triflorum* and *D. heterophyllum* are closely related. The latter has larger, more elongate leaflets and the upper calyx lobes are united to the middle. The two species constitute ser. *Sagotia* of sect. *Sagotia* and therefore stand somewhat apart from other species of the section.

8. Desmodium heterophyllum (Willd.) DC., Prodr. 2:334 (1825); White & Francis, Qld Dept. Ag. & Stock Bot. Bull. 22:14 (1920); Liu & Chang, Taiwania 8:81 t.10 (1962); Ohashi, Ginkgoana 1:239 (1973) & Fl. Camb. Laos Vietn. 27:110 (1994); Verdcourt, Man. New Guinea, Leg. 400 (1979); Pedley, Rev. Handb. Fl. Ceylon 10:179 (1996); *Meibomia heterophylla* (Willd.) 10:179 Kuntze, Rev. Gen. 1:196 (1891); *Hedysarum heterophyllum* Willd., Sp. Pl. 3:1201 (1802); **Type**: Herb. Willdenow 13832 (B, n.v.; microfiche: BRI)

Hedysarum triflorum var. ß & γ L., Sp. Pl. 749 (1753).

Selected specimens**: Queensland.** Cook District: Bolt Head, Temple Bay, 12°15'S 143°05'E, Jul 1991, *Forster* PIF 8988 (BRI); Cairns, Feb 1918, *White* [AQ 19947] (BRI); South Johnstone, Apr 1952, Bureau of Tropical Agriculture [AQ 97399], possibly cultivated (BRI); South Kennedy District: Slade Point, 21°05'S 149°13'E, Aug 1992, *Batianoff* 920853 & *Champion* (BRI).

Distribution and habitat**:** *Desmodium heterophyllum* is a comparatively recent introduction to Australia and is only sparingly naturalised and poorly collected. Little is known of its ecology though it is found on sand behind dunes on beaches immediately north of Cairns. Map 20.

Affinities**:** The species is closely related to *D. triflorum* though not likely to be confused with it. Ohashi (1973) described the upper two lobes of the calyx to be 'deeply incised near base'; they are in fact united to about the middle as can be seen in his illustration (t. 53:3).

9. Desmodium pycnotrichum Pedley, **sp. nov.** leguminibus sutura supera inter articulos acute incisa praeditis similis eis *D. filiformis* Zoll. et Moritzi et *D. trichostachyi* Benth. autem ab ambabus ovario et plerumque aliquis leguminis trichomatibus clavatis ornatis differt. Id foliolum terminale longum *D. filiformis* caret. **Typus:** Northern Territory: Coastal Plains Research Station [12°34'S 131°19'E], Mar 1963, *M. Lazarides* 6828 (holo: CANB; iso: BRI, K, MEL).

Annual herb often flowering and fruiting when ± erect, but becoming prostrate; branches with moderate to dense, stiff, yellowish, spreading hairs 0.8–1.2 mm long. Leaves 3-foliolate, occasionally 1-foliolate; stipules 3–7 mm long, hairy at the base or with marginal hairs; petioles 3.5–21(–24) mm long; rachis 2.5–6.5(–10) mm long; leaflets cuneiform, obovate or sometimes oblong, attenuate at the base, retuse or truncate at the apex, usually glabrous, or occasionally with sparse appressed hairs on the upper surface, sparse appressed or occasionally loosely ascending hairs 0.6 mm long on lower surface; terminal leaflet 8.5–30 mm long, (8–)10–20(–22) mm wide, 0.8–1.5 times longer than wide, laterals smaller, 7–19(–24) mm long, 5–14(–17) mm wide, 0.9–1.6 times longer than wide; pulvinuses 0.8–1.6 mm long; stipels 1.5–2 mm long. Inflorescences terminal, open, to 25 cm long, rachis with sparse to rather dense spreading hairs, rarely appressed, to 1 mm long; flowers single on the rachis; primary bract acuminate, 2.5–5 mm long, pubescent; secondary bract and bracteoles absent; pedicels slender, 5–9 mm long. Flowers: calyx 2–3 mm long with linear lobes, the upper bifid to the middle, the tube ¼–⅓ total length, long hairs on lobes and short sparse uncinate hairs on tube; corolla pink, occasionally red or rarely bluish with standard obovate, 3–3.5 mm long, 1.5–2.5 mm wide, wings c. 2.5 mm long, 0.7–1 mm wide, on short claw, keel petals slightly longer, tapered to the base, not clawed; stamens diadelphous; ovary with dense covering of clavate hairs. Pods ± straight, the upper suture notched between the lobes, the lower deeply indented between them, the isthmus about half width of pod, with 3 or 4 articles, each 2–3.5(–4) mm long, 2–3(–4) mm wide, with indumentum of clavate hairs, rarely some glabrous, nervature similar to that of *D. trichostachyum*; seeds reniform, black when mature, 1.7–3(–3.6) mm long, (1.2–)1.4–2 mm wide with small rim aril.

Selected specimens**: Western Australia.** Manning Creek Gorge, near 'Mt Barnett' Station, 16°39'S 125°55'E, May 1988, *Pullen* 11211 (BRI, CANB, DNA, PERTH). **Northern Territory.** Tortilla Flats, 13°06'S 131°14'E, Apr 1974, *Parker* 411 (DNA, CANB); Woolaning, 13°07'S 130°40'E, Apr 1981, *Dunlop* 5879 & *Craven* (BRI, CANB, DNA, MEL); 12 km S of Hayes Creek, 13°35'S 131°30'E, Apr 1988, *Pullen & Spottswood* 11165 (BRI, CANB, DNA); Douglas Hot Springs National Park, 13°45'S 13°126'E, Apr 1988, *Pullen & Spottswood* 11159 (BRI, CANB, DNA, K, L, PERTH);

Smith Creek, Coburg Penin., 11°07'S 132°08'E, Apr 1977, *Pullen* 10619 (CANB, DNA).

Distribution and habitat: The species usually occurs on sandy soils, sometimes in disturbed situation, sometimes associated with *D. pullenii* (*Pullen & Spottswood* 11158 is a mixed collection). It is confined to the Dieman and Gulf Region of the Northern Territory and the Kimberley Region of Western Australia. Pullen (in sched., *Pullen* 11211) suggests that it may be a recent introduction to Western Australia, but it was collected by Bradshaw and Allen on the Prince Regent River in 1891 (specimens, MEL). Map 21.

Affinities: *Desmodium pycnotrichum* has pods like those of *D. filiforme* and *D. trichostachyum* and is probably closely related to the latter. It differs from both in the unusual clavate trichomes on the ovary which usually persist on the pod. Its foliage resembles that of *D. trichostachyum* and lacks the long terminal leaflet of *D. filiforme*. However, one specimen (*Reeve & Watson* 228, DNA) with elongated terminal leaflets (3–4.5 times longer than wide) possibly represents a *D. filiforme* × *D. pycnotrichum* hybrid.

Etymology: The epithet is a Latinisation of Greek: *pychno*, thick, and *thrix*, *trichos*, hair, a reference to the peculiar indumentum of ovary and, usually, pods. Specimens have been distributed with the name *D. 'clavitricha'*, a name coined by Mr R. Pullen who recognised the species as distinct. Regrettably the epithet is neither grammatically nor etymologically acceptable and has therefore been replaced.

10. Desmodium trichostachyum Benth., Fl. Austr. 2:234 (1864); Ohashi, Ginkgoana 1:244 (1973). *Meibomia trichostachya* (Benth.) Kuntze, Rev. Gen. 1:198 (1891). **Type:** Port Essington, *Armstrong* (lecto: K, chosen here).

Prostrate or slightly ascending annual herb; stems slender, terete, glabrous or with sparse appressed or occasionally spreading hairs (0.6 mm long). Leaves 1- or 3-foliolate, sometimes on separate plants, sometimes leaves of both types on one plant, in which case the 1-foliolate produced before the 3-foliolate ones; stipules ovate or deltoid, acute, 2.5–4 mm long, 1–1.5 mm wide; petiole 3–12 mm long, rachis 1–4 mm long; leaflets depressed ovate, orbicular or occasionally broadly oblong, rounded or subcordate at the base, retuse at the apex when 1-foliolate, cuneiform, rounded or subcordate at the base, truncate or retuse at the apex when 3-foliolate, all ± glabrous or with sparse appressed hairs on lower surface; when 1-foliolate, leaflet 8–20 mm long, 9–20 mm wide, 0.7–1.2 (–1.4) times wider than long; when 3-foliolate terminal leaflet 5–15 mm long, 6–16 mm wide, 1–1.4 times wider than long, lateral leaflets smaller, 4–12 mm long and wide, (0.7)1–1.2 times longer than wide; pulvinuses 0.5–1.5 mm long; stipels 0.2–1 mm long. Inflorescences terminal, very open, to 25 cm long, the rachis with a few appressed or rarely spreading hairs towards the apex, flowers single (rarely in pairs) subtending by an ovate acuminate bract 1–2 mm long, secondary bracts and bracteoles absent; pedicels slender, 2–6 mm long, doubling in length in fruit. Flowers: calyx 1.4–2.1 mm long, uncinately pubescent or occasionally lobes strigose with hairs to 1 mm long; tube 0.5–0.7 mm long, upper lobe 0.8–1.4 mm long, incised to about the middle, other lobes shorter or about equal in length, 0.6–1.3 mm long; corolla purplish: standard obovate, obtuse or retuse at apex, narrowed to base but not distinctly clawed, 2.5–3.3 mm long (1.6-)2–2.5 mm wide, wings broad oblong with short claw, 1.8–2.5 mm long, 0.7–1.2 mm wide, keel petals somewhat longer and narrower than wings, 2.2–2.9 mm long, 0.7–1 mm wide, tapered to base, not distinctly clawed. Pods with upper suture thickened, notched between articles, lower indented, isthmus ½–⅔ width of pod, with 3–5 articles, each 2–2.8 mm long and wide, glabrous or with uncinate hairs, transversely reticulately veined; seed 1.3–1.7 mm long, 0.9–1.5 mm wide, with a rim aril.

Selected specimens: **New Guinea.** MERAUKE: Koerike Camp, c.15 km NE of Koembe village on Koembe river, Sep 1954, *P. van Royen* 4910 (L). **Western Australia.** King Edward River Crossing, May 1975, *Symon* 10250 (NSW); Augustus Is., 15°25'S 124°35'E, May 1972, *Wilson* 10719b & 10877 (PERTH). **Northern Territory.** Humpty Doo, Feb 1961, *McKee* 8356 (CANB, K, L); Arnhem Land, 12°55'S 135°17'E, Jun 1972, *Maconochie* 1498 (DNA, K); Elcho Is., Jul 1975, 11°47'S 135°53'E, *Maconochie* 2223 (DNA). **Queensland.** COOK DISTRICT: Newcastle Bay [10°49'S 142°36'E], May 1948, *Brass*

18740 (BRI, CANB, K, L); 2 km S of Moreton Telegraph Station, 12°28'S 142°38'E, *Kanis* 2037 (CANB, L); Endeavour River, Jun 1819, *Cunningham* 243 (K); Gorge Creek, 10 miles [16 km] W of Mareeba, Apr 1962, *McKee* 9265 (BRI, CANB, K, L).

Distribution and habitat: *Desmodium trichostachyum* occurs on sandy soils, sometimes seasonally waterlogged, in eucalypt and *Melaleuca* communities in coastal areas from the Kimberley region of Western Australia, through the Northern Territory to northern Queensland south to about the Atherton Tableland. It also occurs in southern New Guinea. Map 22.

Affinities: *Desmodium trichostachyum, D. pycnotrichum, D. filiforme* and *D. brownii* constitute a complex of species of ser. *Stenostachys* characterised among other attributes by small pods with the upper suture distinctly notched between the articles. This attribute distinguishes them from another complex of species, *D. glareosum, D. hannii, D. muelleri* and *D. pullenii*, where the upper suture is continuous, not notched between the articles.

The dimorphic foliage of *D. trichostachyum* distinguishes it from all other species. Living plants have not been studied but a sequence of development of leaves can be deduced from the large number of herbarium specimens examined. The plants which are annual or short-lived perennials first develop leaves with a single depressed ovate leaflet. If environmental conditions favour rapid growth plants may flower and fruit at this stage, or, if not, may develop leaves with three cuneiform leaflets before flowering. Consequently plants with unifoliolate leaves only, trifoliolate leaves only, or commonly a mixture of both are represented in herbarium collections. The lectotype specimen has both uni- and trifoliolate leaves.

11. Desmodium filiforme Zollinger & Moritzi, Natuur-en Geneeskunding Archief voor Nedeêland's Indie 3:58, 77 (1846); Ohashi, Ginkgoana 1:237 (1973); *Meibomia filiformis* (Zoll. & Moritzi) Kuntze 1:198 (1891). **Type:** '*Zoll. & Mor. Herb.* 2738'. Java in arenosis maritimis prope Poeger (iso:BM)

Desmodium neurocarpum Benth., Fl. Austr. 2:234 (1864); *Meibomia neurocarpa* (Benth.) Kuntze, Rev. Gen. 1:198 (1891). **Type:** Upper Victoria River, *Mueller* (holo: K).

Desmodium neurocarpum var. *queenslandicum* Domin, Biblioth. Bot. 89:214 (1926). **Type:** In fl. Flinders River ad opp. Hughenden, Feb 1910, *Domin* '4733' (lecto: PR 527380, chosen here).

Sprawling annual, stems terete with indumentum of long (to 1 mm) spreading hairs, occasionally subglabrous. Leaves 3-foliolate or, usually on young plants, 1-foliolate or both 1- and 3-foliolate; stipules triangular, 2–5 mm long; petioles 4–18 mm long; rachis 1.5–6 mm long; leaflets chartaceous, linear-oblong, oblong or obovate-oblong, rounded or subcordate at the base, emarginate at the apex, usually with scattered appressed hairs on the upper surface, sparse appressed hairs on the lower surface, sometimes glabrous; terminal leaflet 10–35(–45) mm long, 3.5–12.5(–14) mm wide, 1–5(–8) times longer than wide, lateral leaflets smaller, (5–)10–22(–26) mm long, 3–7(–10) mm wide, 1.4–4.5(–6.5) times longer than wide. Inflorescences terminal, open, to 20 cm long, rachis with long hairs, usually spreading, sometimes appressed, to 1 mm long; flowers single along rachis, primary bract 2–3 mm long, deciduous, secondary bracts and bracteoles absent; pedicels 3–4 mm long. Flowers: calyx 2.3–2.5 mm long, indumentum of minute uncinate hairs and long (0.6–1 mm) straight hairs on lobes; tube 0.7 mm long, all lobes about equal length, tending sometimes to incurve, the upper divided to ½–⅔ length, the lower sometimes narrower than the others; corolla white to pink or mauve; standard obovate, obtuse at apex, 2.5–2.7 mm long, 1.6–2.2 mm wide, wings and keel petals about equal in length, 2–2.6 mm long; stamens diadelphous; ovary usually with rather sparse uncinate hairs or occasionally glabrous. Pods straight, the upper suture sharply notched between articles, the lower undulate, isthmus about ½ width of pod, with 3, 4 or rarely 5 articles, each (2.5)3–5 mm long, 2.5–4(–4.5) mm wide, one exceptional specimen with only one article per pod developed, 5.5–6.2 mm long, 4 mm wide, glabrous or sparsely uncinate pubescent, reticulated veined (often purplish), raised in centre over seed, usually the anastomoses small,

± equilateral in central area and larger, radially rectangular to the periphery; seeds 2–3 mm long, 1.5–2 mm wide.

***Selected specimens*: Java.** Berachi, Poegar, Apr 1929, *Backer* 3650 (L). **New Guinea.** Merauke, Aug 1904, *Kock* (L); Koitaki, Jun 1935, *Carr* 12673 (CANB, K, L). **Western Australia.** 16 km S of Port Hedland, 20°23'S 118°40'E, Apr 1977, *George* 14565 (K, PERTH); 19.6 km S of Derby, 17°27'S 123°44'E, Apr 1985, *Aplin et al.* 58 (PERTH); 5 miles [8 km] W of Kununurra, East Kimberleys, 14°46'S 128°41'E, Mar 1963, *Lazarides* 6733 (CANB); NW of Deception Range, 15°53'S 128°36'E, Mar 1978, *Hartley* 14784 (CANB, PERTH); Piccaninny Creek Gorge, 17°27'S 128°25'E, *Blackwell* BB 187, 180b & 377 (PERTH). **Northern Territory.** Daly River, 13°52'S 131°11'E, Apr 1988, *Pullen & Spottswood* 11162 (CANB); McArthur River area, 16°07'S 136°07'E, Jun 1976, *Craven* 4088 (CANB); South Bickerton Is., 13°45'S 136°06'E, Jun 1948, *Specht* 505 (BRI, CANB, K, MEL); Maude Creek, 12 miles [19 km] NE of Katherine, 14°23'S 132°24'E, Mar 1965, *Wilson* 370 (CANB, K). **Queensland.** BURKE DISTRICT: E of 'Westmoreland' Station, 17°30'S 138°20'E, May 1974, *Pullen* 9131 (CANB, K); COOK DISTRICT: Cooktown, mouth of Endeavour River, 15°28'S 145°15'E, May 1970, *Blake* 23296 (BRI, K, MEL); Mareeba, Apr 1967, *Pedley* 2270 (BRI, K); NORTH KENNEDY DISTRICT: 70 km S of Charters Towers, 20°40'S 146°17'E, May 1988, *Pullen* 11255 (CANB); PORT CURTIS DISTRICT: Rockhampton, Apr 1867, *O'Shanesy* 116 (MEL).

***Distribution and habitat*:** *Desmodium filiforme*, the most widespread species of ser. *Stenostachys* in tropical Australia, occurs over most of the northern half of Queensland and extends across the Northern Territory to the northern part of the Kimberley region of Western Australia with isolated occurrences near Port Hedland (*George* 14565) and Lake Surprise, Lander River (*Maconochie* 1695). It is also found in southern New Guinea and Java. The species is confined to sandy soils, sometimes seasonally waterlogged, in eucalypt communities, dry beds of streams, flood-outs and coastal dunes; in coastal areas it is sometimes associated with *D. trichostachyum*. Map 23.

***Affinities*:** Because of its long terminal leaflet *D. filiforme* most closely resembles *D. pullenii* but differs from it in having the upper suture of the pod notched between articles and the central portion of each article raised over the seed with the veins closely anastomosing and radiating to the margins. It and *D. brownii* which has narrower leaflets are probably more closely allied to *D. trichostachyum* and *D. pycnotrichum* which have similar pods.

Knaap-van Meeuwen (1962) included *D. muelleri*, and judging from her remarks, possibly also *D. pullenii* in *D. filiforme*. Ohashi (1973) pointed out that such a treatment was unacceptable; he also suggested that *D. filiforme* can be separated from *D. trichostachyum* only with considerable difficulty except for the shape of the leaflets and pods. The shape of the leaflets and the indumentum of the branchlets and leaves, but not the shape of the pods, are sufficient to differentiate the two species. Ohashi may also have had material of more than one species.

12. Desmodium brownii Schindl., Notes Roy. Bot. Gard. Edinburgh 25:13 (1926) & Rep. sp. nov. reg. veg. 22:256 (1926). **Type:** (syntypes): North Coast, *Brown* s.n. (E?, not seen); *Brown* '4188' (iso: BM, K).

Desmodium neurocarpum var. *gracile* Benth., Fl. Austr. 2:234 (1864). **Type:** North Coast, *Brown* (holo:K).

Erect annual to 75 cm tall; stems ± terete with indumentum of weak erect uncinate hairs, often with stiff ascending or spreading hairs 0.6–1 mm long. Leaves 3-foliolate or 1-foliolate towards the base of the plant; stipules rather attenuate, 2–6.5 mm long; usually with long hairs on the margin; petioles 2–9(–15) mm long; rachis (1–)2–4(–5) mm long; leaflets linear or oblong-linear, rounded at the base, obtuse at the apex, glabrous or with sparse appressed, rarely ascending hairs on upper surface, sparse appressed hairs on lower; terminal leaflet 10–50(–65) mm long, 1.8–4(–5.5) mm wide, 3.5–13 times longer than wide, laterals smaller 5.5–36 mm long, 1.5–4.5 mm wide 3–12(–14) times longer than wide. Inflorescence terminal and in the upper axils, to 20 cm long, open; rachis with indumentum of uncinate hairs, occasionally with long hairs near the base; flowers single or rarely in pairs; primary bracts 1.5–3 mm long, acuminate, pubescent on margin in upper half, deciduous; secondary bracts and bracteoles absent; pedicels filiform, 5–15 mm long. Flowers: calyx tube c. 0.5 mm long, the lobes all 0.6–0.7 mm long, the upper divided to about the middle, the lower acuminate; corolla pink or mauve with standard obovate c. 3 mm long, 3 mm wide; wings oblong, c. 2 mm long; keel petals about as long as the wings. Pod flat, the upper suture notched at the junction of the articles, the lower more gently incised, the isthmus ¼–½ width of pod, with 3 or 4 articles, each oblong or orbicular 2.5–3.5 mm long, 2.2–3 mm wide, uncinate hairs on faces and fringe of uncinate hairs on margins, sometimes becoming glabrous, reticulately nerved, raised in centre over the seed, usually the anastomoses small, ± equilateral in central area, larger and radially rectangular to the periphery; seeds 1.7–2.5 mm long, 1.3–1.7 mm wide, with a small rim aril.

Selected specimens: **Western Australia.** King Leopold Range, 17°02'S 125°14'E, May 1988, *Pullen* 11206 (CANB); Carr Boyd Range, 20 km ENE of 'Dunham River' H.S., 16°15'S 128°30'E, Mar 1978, *Lazarides* 2814 (CANB, K, PERTH); Weaber Range, 15°20'S 128°48'E, Mar 1978, *Hartley* 14472 (CANB, PERTH). **Northern Territory.** Woolaning, 13°07'S 130°40'E., Apr 1981, *Dunlop* 5880 (CANB, DNA, MEL NSW); 8 miles [13 km] NNE of Edith River siding, Mar 1965, *Lazarides & Adams* 117 (BRI, CANB, K, MEL); 16 miles [26 km] SE of El Sharana mine, 13°41'S 132°41'E, Feb 1973, *Lazarides* 7873 (AD, CANB, K, PERTH); Victoria River, Gregory National Park, 15°28'S 131°15'E, *Wightman* 2767 & *Clark* (DNA). **Queensland.** Cook District: 19 km S of Palmer River crossing 16°15'S 144°43'E, Mar 1987, *Clarkson* 6639 & *McDonald* (BRI, K, MBA).

Distribution and habitat: *Desmodium brownii* is confined to the southern part of Cape York Peninsula, Queensland, the northern part of the Northern Territory and the Kimberley region of Western Australia, on sandy soil, often shallow or gravelly on hillsides. Map 24.

Affinities: The species is closely related to *D. filiforme* to which Bentham referred it as a variety (of *D. neurocarpum*), but differs in its erect habit, narrower leaflets, rachis of the inflorescence lacking spreading hairs except at the base, and longer pedicels.

13. **Desmodium flagellare** Benth., Fl. Austr. 2:233 (1864); Schindl., Rep. sp. nov. reg. veg. 22:255 (1926); *Meibomia flagellaris* (Benth.) Kuntze 1:198 (1891). **Type:** Beagle Valley [approx. 15°35'S 130°55E', in 1855, *Mueller* (holo:K).

Prostrate annual spreading to a metre or more; branches terete with sparse to moderately dense ascending to ± spreading hairs to 0.5 mm long with shorter dense uncinate hairs. Leaves 3-foliolate or 1-foliolate towards base of plant; stipules 3–6 mm long, somewhat acuminate, with a few long hairs; petiole 5–12 mm long; rachis 1.5–4 mm long; leaflets cuneiform, obovate or oblong, rounded or slightly cordate at the base, slightly retuse at the apex, glabrous on upper surface, sparse appressed pubescent on lower surface or hairs confined to midrib and margins, hairs rather loose; terminal leaflet 15–25 mm long, 14–20 mm wide, the lateral ones smaller, 10–20 mm long, c. 12 mm wide, all (1–)1.2–1.4 times longer than wide; pulvinuses and stipels 1–1.5 mm long. Inflorescences terminal and in upper axils, to 20 cm long, rachis with sparse appressed hairs, fruiting pedicels c. 20 mm apart on rachis, rather closer than in related species; flowers single on the rachis; primary bract concave, ovate, 2–5 mm long, rather persistent, secondary bracts and bracteoles absent; pedicels 3–7 mm long. Flower: calyx 3–4 mm long, the tube c. 1 mm long, upper lobe divided to about the middle, lobes with long white spreading hairs; corolla not examined; stamens diadelphous; ovary densely uncinate pubescent. Pods with upper suture continuous, not notched between articles, the lower indented, isthmus c. ⁴/₅ width of pod, with 1–3, rarely 4 articles, each 3.5-4.5 mm long, 3–3.5 mm wide, uniformly sparsely to densely pubescent on faces and margins with uncinate hairs; seeds not seen.

Specimens examined: **Western Australia.** Kimberley Research Station [15°39'S 129°43'E], Mar 1963, *Lazarides* 6784 (CANB, K, PERTH). **Northern Territory.** Victoria River, Gregory National Park, 15°35'S 131°21'E, Feb 1986, *Wightman* 2777 & *Clark* (DNA).

Distribution and habitat: *Desmodium flagellare* is restricted to heavy soils and has an extremely limited geographic range in the lower part of the Ord and Victoria River basins. Map 25.

Affinities: The type material of *D. flagellare* is so poor as to make interpretation of the name of the species difficult; not only is the type specimen fragmentary but, as Schindler pointed out, it is intertwined with another legume (Cajanineae, probably *Rhynchosia* sp.). The pods with the continuous upper suture and with rather large articles, suggest a relationship with *D. hannii* and *D. muelleri*, species also common on heavy soils. Further specimens are needed for the species to be described in detail and its relationships clarified.

14. Desmodium hannii Schindl., Rep. sp. nov. reg. veg. 21:4 (1925). **Type:** Carpentaria, *F.C. Hann* (B†). Queensland. Cook District: 4.8 km N of Little Laura River on Peninsula Development Road, (15°30'S 144°17'W), 27 April 1983, *J.R. Clarkson* 4780(neo: BRI; isoneo. CANB, K, MBA, QRS; chosen here).

Decumbent or prostrate annual herb, stems up to 1 m long; branches with sparse spreading or ± appressed white hairs and sometimes shorter uncinate hairs. Leaves 1- or 3-foliolate (usually on same plant); stipules 2.5–4.5 mm long, 1–1.8 mm wide at base; petioles (1.5–)4–9(–16) mm long, rachis 1–3.5 mm long; leaflets chartaceous, cuneiform or broadly obovate when trifoliolate, or obicular when 1-foliolate, rounded or slightly emarginate at the base, rounded at the apex, glabrous or with scattered appressed hairs above, with sparse to moderate appressed or somewhat ascending hairs especially on midrib beneath, 3 or 4 prominent lateral veins on each side of midrib; terminal leaflet 6–25(–30) mm long, 6–20 mm wide, 0.9–1.5(–1.8) times longer than wide; lateral leaflets smaller, 6–15 mm long, 6–12 mm wide, 0.9–1.3 times longer than wide. Inflorescences terminal and/or axillary, open, to 12 cm long; rachis with appressed hairs c. 1 mm long; flowers solitary; primary bracts ovate, 3.2–3.5 mm long, early deciduous; secondary bracts and bracteoles absent; pedicels 3–4.5 mm long. Flowers: calyx 2.7–3.2 mm long, long hairs on margins and midlines of lobes; tube 0.7–0.9 mm long, upper lobe 2–2.5 mm long, narrowly triangular, wider than the others, divided to about the middle; lateral lobes 1.8–2.5 mm long, lower lobes c. 2 mm long, slightly wider than laterals; corolla pink or mauve; standard obovate, obtuse at the apex, 3-4 mm long, 1.6–3 mm wide; wings 2.3–2.8 mm long, shortly clawed, c. 1 mm wide; keel petals longer and narrower than wings, 2.6–3.5 mm long, 0.5–1 mm wide; stamens diadelphous; ovary pubescent. Pod lightly but distinctly recurved, the upper margin continuous, not notched between articles, the lower incised, the isthmus ⅓–½ or more width of pod, with 2–4, rarely 5 articles, each (2.5–)2.8–4.2(–5) mm long, 2.5–3.5 mm wide, pubescent with uncinate hairs, particularly on margins; seeds c. 2.5 mm long, 1.6 mm wide.

Selected specimens: **Western Australia.** King Leopold Ranges, 17°07'S 125°20'E, May 1988, *Pullen* 11205 (CANB). **Northern Territory.** 3 km S of Katherine, 14°29'S 133°46'E, May 1988, *Pullen & Spottswood* 11176 (CANB); Beswick Aboriginal Reserve, 14°33'S 133°00'E, May 1974, *Pullen* 9329 (BRI, CANB, K); 38 miles [61 km] ESE of 'Limbunya' Station, Jun 1949, *Perry* 2294 (CANB, PERTH). **Queensland.** Cook District: 4.8 km N of Little Laura River, 15°30'S 144°17'E, Apr 1983, *Clarkson* 4780 (BRI, CANB, K, MBA, QRS).

Distribution and habitat: *Desmodium hannii* has a discontinuous distribution in tropical Australia. It appears to be most common and has been most frequently collected in the north-central part of the Northern Territory with two collections from the Kimberley region of Western Australia. It also occurs in north-eastern Queensland. It favours heavy soils and sometimes occurs with *D. muelleri* (collector's note: *Pullen* 9329) and its absence from grassland dominated by *Astrebla* spp. and *Dichanthium* spp. in north-western Queensland is unexpected. It is reported to be favoured by stock. Map 26.

Affinities: The species is a member of ser. *Stenostachys* closest to *D. muelleri* from which it differs in its curved pods, leaves often unifoliolate with less elongate leaflets. It may be a neotonic derivative of *D. muelleri* bearing the same relationship to it as *D. trichostachyum* does to *D. pycnotrichum*.

15. Desmodium muelleri Benth., Fl. Austr. 2:235 (1864); van Meeuwen, Reinwardtia 6:249 (1962), pro syn. *Meibomia muelleri* (Benth.) Kuntze, Rev. Gen. 1:198 (1992). **Type:** Upper Victoria River, *Mueller* (holo:K).

Decumbent or prostrate annual; stems with indumentum of sparse stiff, usually appressed, occasionally ascending, rarely spreading, white hairs to c. 1 mm long. Leaves 1- or 3-foliolate, both on same or occasionally on different plants; stipule 3–6 mm long glabrous or with marginal hairs; petiole 3–12 mm long, rachis 1.5–5 mm long; leaflets chartaceous, narrowly ovate, elliptic or oblong, occasionally broadly oblong when 1-foliolate, rounded at the base, obtuse or retuse at the apex, glabrous or occasionally with sparse appressed hairs on upper surface, sparse or moderately dense appressed hairs on lower surface; terminal leaflet 12–45(–60) mm long, 5–15(–20) mm wide, 1.2–6 times longer than wide, the laterals smaller, 10–30(–35) mm long, 2.5–12 mm wide, 1.5–6 times longer than wide; pulvinuses 0.5–1.5 mm long, stipels 0.7–2.5 mm long. Inflorescences terminal, usually rather sparsely flowered, to 30 cm long, rachis glabrous or with uncinate and/or scattered to rather dense straight spreading hairs to 1 mm long; flowers single or in pairs, subtended by primary bract (2.5–)3–4.5 mm long, pubescent or hairs confined to margin; secondary bracts and bracteoles absent; pedicel 7–10 mm at anthesis, 15 mm long in fruit. Flowers: calyx 2.8–3.3 mm long, long straight hairs on lobes, the tube c. 1 mm, upper lobe divided to about the middle, 1.5–1.8 mm long, the others setaceous, 1.6–2.3 mm long, the lower slightly longer than the laterals; corolla pink to mauve with standard obovate, obtuse at the apex, 3.5–5 mm long, 2.5–3 mm wide, keel 3.5–4.5 mm long, slightly longer than the wings; stamens diadelphous; ovary densely pubescent. Pods straight, the upper suture continuous, not notched between articles, the lower slightly incised, the isthmus $^4/_5$ or more width of pod; with 4–6 articles, each (3.6–)4–5 mm long, 3–4 mm wide, transversely reticulately veined, moderately uncinate pubescent on faces with distinct marginal hairs; seed (2.3–)2.8–3.2 mm long, (1.6–)1.8–2.3 mm wide with distinct rim aril.

***Selected specimens*: Western Australia.** Walsh Pt, Port Warender, *Keighery* 4806 (PERTH); Mitchell Plateau mining camp, 14°26'S 125°47'E, Apr 1977, *George* 14480 (K, PERTH); Kimberley Research Station, Jul 1952, *Perry* 3036 (CANB, K, MEL, PERTH) & Mar 1963, *Lazarides* 6786 (CANB, PERTH). **Northern Territory.** 4 miles [6 km] N of 'Rankin', Mar 1956, *Chippendale* NT 1869 (DNA, MEL, PERTH); 12 km S of Katherine, 14°31'S 132°23'E, Apr 1988, *Pullen & Spottswood* 11172 (BRI, CANB, K); c. 26 miles [42 km] NNW of 'Brunette Downs', May 1947, *Blake* 17813 (BRI, CANB, K, MEL). **Queensland.** BURKE DISTRICT: 30 miles [48 km] NNE of Camooweal, May 1948, *Perry* 982 (CANB, K); SW of Normanton, 17°45'S 140°57'E, Apr 1974, *Pullen* 8887 (CANB, K); NORTH KENNEDY DISTRICT: between Powelathunga and Charters Towers, 20°10'S 146°00'E, May 1988, *Pullen* 11250 (BRI, CANB).

***Distribution and habitat*:** *Desmodium muelleri* ranges across northern Australia from the Kimberley region of Western Australia to south-western and north-central Queensland (near Charters Towers). It extends into semi-arid areas, and is virtually confined to heavy soils, often in grassland dominated by *Astrebla* spp. or *Dichanthium* spp. The western part of its range is rather fragmented, probably because of lack of suitable habitat. Map 27.

***Affinities*:** *Desmodium muelleri* and *D. hannii* are closely related and are distinguished from other species of ser. *Stenostachys* (except perhaps from the poorly known *D. flagellare*) by pods not notched between the rather large articles. As Ohashi (1973) and Verdcourt (1979) pointed out, Knaap-van Meeuwen's referral of *D. muelleri* to *D. filiforme* is unacceptable.

16. Desmodium glareosum Pedley, **sp. nov.**, *D. muelleri* Benth. leguminis sutura supera continua non inter articulos acute incisa similis autem leguminis articulis et foliolis parvioribus differt; a *D. pullenii* Pedley pilis ramulorum foliolorumque albis incohaerentibus, foliolo terminali angustiore differt; a *D. filiformi* Zoll. et Moritzi leguminis sutura supera continua non inter articulos acute incisa, pilis ramulorum albis differt. **Typus:** NORTHERN TERRITORY: c. 8 miles [13 km] NNE of Edith River Siding, March 1965, *M. Lazarides & L.G. Adams* 115 (holo: CANB; iso: BRI, DNA, K, L, NSW).

Annual, erect or becoming prostrate, foliage described as greyish; stems with indumentum of usually weak moderately dense ascending (rarely appressed) white hairs 0.6–1 mm long. Leaves 3-foliolate; stipules narrow lanceolate, 1.5–4 mm long, 0.5–1.2 mm wide, with a few long hairs on the margins; petiole (0.5–)2.5–8 mm long, rachis 1.5–3.5 mm long; leaflets oblong, obovate or almost orbicular, rounded or subcordate at the base, obtuse or retuse at apex, indumentum of weak, sparse to moderate loose ascending hairs c. 0.6 mm long on both surfaces; terminal leaflet 5–19(–26) mm long, 2.5–6.5(–11.5) mm wide, 1.4–4.5(–7) times longer than wide, lateral leaflets smaller, 3.5–13(–20) mm long, 1.8–6(–8.5) mm wide, 1.1–3.5(–4.5) times longer than wide; pulvinuses 0.5–1 mm long, stipels 0.3–0.6 mm long. Inflorescences terminal, rather open, to c. 10 cm long, the rachis with moderately dense, rather spreading hairs; flowers single, pedicels slender, 5–15 mm long, subtended by deciduous ovate pubescent bract 1.5–3 mm long; secondary bract and bracteoles absent. Flower: calyx 1.5–1.7 mm long, with indumentum of sparse spreading hairs to 0.8 mm long, tube 0.5–0.7 mm long, lobes c. 1 mm long, the upper divided to about the middle; corolla pink or mauve; standard c. 3 mm long and 2 mm wide; wings c. 2 mm long, 1 mm wide; keel petals slightly longer than the wings, 2–2.8 mm long; stamens diadelphous; ovary moderately pubescent with ascending hairs. Pods ± straight, the upper suture ± continuous (as in *D. muelleri, D. hannii* and *D. pullenii*), not notched between articles; isthmus ½–⅔ width of pod; lower suture deeply indented; with 2–4(–5) articles, each 2.5–3.4 mm long, 2.2–3(–3.3) mm wide, sparsely to moderately pubescent on faces, fringed on sutures, transversely reticulately veined; seeds 1.7–2.1 mm long, 1.4–1.8 mm wide, shining black when mature.

***Selected specimens*: Western Australia.** Mitchell Plateau, 14°49'S 125°45'E, May 1988, *Pullen* 11219 (CANB). **Northern Territory.** Manton River, 12°50'S 131°10'E, May 1973, *Dunlop* 3146 (BRI, CANB, DNA, K, NSW); 11 km E of Katherine, 14°26'S 132°15'E, Apr 1977, *Pullen* 10592 (CANB, K, L); 16 km NE of Katherine, 14°24'S 132°22'E, Apr 1988, *Pullen* 11171 (AD, BRI, CANB, K, MEL, NSW, PERTH); 22 miles [35 km] N of Katherine, Feb 1965, *Wilson* 301 (BRI, CANB, DNA, K, L).

***Distribution and habitat*:** The species has usually been recorded from gravelly soils, sometimes in disturbed situations such as roadsides. It is evidently sometimes associated with *D. pullenii*. It occurs in Western Australia (Mitchell Plateau and Weaber Range), and in the north-west of the Northern Territory. Map 28.

***Affinities*:** *Desmodium glareosum* is a member of ser. *Stenostachys*, one of a group of species that includes *D. muelleri, D. hannii* and *D. pullenii* with the upper suture of the pod ± continuous (only slightly undulate) not sharply notched between articles. It is most closely related to *D. pullenii*.

***Etymology*:** The specific epithet is Latin *glareosum*, gravelly, a reference to the usual substrate of the species.

17. Desmodium pullenii Pedley, **sp. nov.** similis *D. muelleri* Benth. leguminis sutura supera continua inter articulos non incisa autem leguminis articulis seminibusque parvioribus, foliolis interdum parvioribus pilis ramulorum aliquantum densis flavidis curvatis differt. **Typus:** Northern Territory. 12 km S of Hayes Creek, 13°35'S 131°30'E, April 1988, *R. Pullen & Spottswood* 11169 (holo: CANB; iso: BRI, DNA, NSW, PERTH).

Desmodium sp. (Laura V.J.Neldner + 3836) Pedley in Henderson: Queensland Plants: Names & Distribution: 79 (1997).

Weak erect annual herb to c. 30 cm high; stems with indumentum of sparse to moderately dense stiffly spreading or curved hairs 0.5–1 mm long. Leaves trifoliolate; stipules deltoid to lanceolate, 2.5–6 mm long, glabrous or with a few marginal hairs; petioles 3–13 mm long, rachis 1.5–6.5 mm long; leaflets obovate or oblong, rounded at the base, obtuse or slightly retuse at the apex, upper surface with sparse appressed or rarely ascending hairs, rarely glabrous, lower surface appressed pubescent, hairs 0.5–1 mm long; terminal leaflet 7–22(–27) mm long, 4.5–11 mm wide, 1.4–2.5(–4) times longer than wide, lateral leaflets somewhat smaller, 5–17(–23) mm long, 3.2–8(–9.5) mm wide, 1.2–2.5 very rarely to 4.5 times longer than wide; pulvinuses and stipels 0.5–1.3 mm long. Inflorescence open, to 20 cm long, rachis with weak long spreading (rarely appressed) usually yellowish hairs; flowers single along the rachis; primary bract 2–3 mm long, deciduous; secondary bract and bracteoles absent; pedicels filiform 5–14 mm long. Flowers: calyx 1.5–2 mm long wth short

(0.1–0.3 mm) spreading hairs, tube 0.4–0.6 mm long, lobes about of equal length, 1.2–1.5 mm long, the upper bifid to 0.3–0.5 mm; corolla ranging in colour from white through pink to pale purple, usually described as pink: standard obovate occasionally somewhat truncate at apex, 3–4 mm long, 2.4–2.7 mm wide, wings 2–2.5 mm long, c. 1 mm wide, shortly clawed; keel petals longer than wings, 3–4 mm long, about as wide; stamens diadelphous; ovary pubescent. Pods straight, upper suture continuous, not sharply notched between articles, lower incised, isthmus ½–¾ width of pod; with usually 4 or 5 articles, each 2.7–3.5 mm long, 2.5–3.2 mm wide, moderately densely uncinate pubescent with fringe of hairs, occasionally becoming glabrous, transversely reticulately veined; seeds 1.8–2.2 mm long, 1.5–1.7 mm wide, shining black at maturity, with a small rim aril.

Selected specimens: **Lesser Sunda Islands**. Alor: Landschaft Kei, Moroe-Gendok, May 1938, *O. Jaag* (L). **Western Australia.** 5 km N of Port Warrender road, Mitchell Plateau, 14°45'S 125°46'E, May 1988, *Pullen* 11222 (CANB, PERTH); 2.9 km SE of Mitchell Plateau mining camp 14°50'S 125°51'E, Apr 1977, *George* 14504 (AD, MEL, PERTH). **Northern Territory.** Beatrice Hill [12°39'S 131°19'E], Mar 1961, *Chippendale* NT 7963 (CANB, DNA); 25 km W of Mary River, 12°52'S 131°48'E, Mar 1978, *Maconochie* 2332 (AD, BRI, CANB, K, MEL); Katherine Gorge National Park, 14°20'S 132°25'E, Apr 1981, *Craven* 6708 (CANB). **Queensland.** COOK DISTRICT: Endeavour River, in 1878, *Persietz* 232 (MEL); Yorkey's Knob Beach [16°49'S 145°43'E], Apr 1962, *McKee* 9011 (BRI, CANB, K); NORTH KENNEDY DISTRICT: Castle Hill, Townsville, [19°16'S 146°45'E], Nov 1947, *Shaw* 5507 (CANB).

Distribution and habitat: In Australia *D. pullenii* ranges across northern parts from the north of Western Australia to about Gladstone in central Queensland. It occurs on sand dunes and in eucalypt communities usually on sandy soils, but it has also been recorded from clay. It has also been collected in the Lesser Sunda Is. Map 29.

Affinities: The species belongs to ser. *Stenostachys* and is closely related to *D. glareosum* which has long loose white hairs on the stems and leaves, and usually narrower terminal leaflets. The Malesian specimen cited was determined by Knaap-van Meeuwen as *D. filiforme* and she probably included *D. pullenii* in her wide circumscription of that species. Schindler annotated some specimens in herb. Kew as *D. muelleri* var. *minus* and the name has been used in other herbaria though never validated.

Etymology: The epithet honours Mr Roy Pullen, formerly of CSIRO, Canberra, whose field, herbarium and other studies of *Desmodium* in Australia have made this account of the genus possible.

18. Desmodium heterocarpon (L.) DC., Prodr. 2:337 ('heterocarpum'); Liu & Chuang, Taiwania 8:80 t. 9 (1962); Fosberg, Micronesiaca 2:145 (1966); Schubert, Fl. Trop. East Africa. Legum. Papilion. 462 (1971); Ohashi, Ginkgoana 1:120 (1973), Man. Flow. Pl. Hawai'i 1:667 (1990), J. Jap. Bot. 66:14 (1991) & (in part) Fl. Camb. Laos Vietn. 27:136 (1994); Verdcourt, Man. New Guinea Leg. 399 (1979); Pedley, Rev. Handb. Fl. Ceylon 10: 187 (1996); *Meibomia heterocarpa* (L.) Kuntze, Rev. Gen. 1:198 (1891); *Hedysarum heterocarpon* L., Sp. Pl. 747 (1753). **Type:** Herb. Hermann vol. 2 fol. 32, No. 94, left-hand specimen lecto: BM, *fide* Pedley in Turland & Jarvis (1997).

Desmodium polycarpon (Poir.) DC., Prodr. 2:334 (1825) (as 'polycarpum'); Benth., Fl. Austr. 2:235 (1864); *Hedysarum polycarpon* Poir. in Lam., Encycl. Meth. 6:413 (1805). **Type:** 'Indes orientales in herb. Lam' (P, n.v.).

Hedysarum tuberculosum Labill., Sertum Austro-Cal. 71 t. 72 (1824). **Type:** New Caledonia, La Billadière (n.v.).

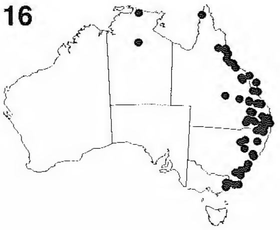
Desmodium trichocaulon DC., Prodr. 2:335 (1825); Benth., Fl. Austr. 2:235 (1864). **Type:** Nepal, *Wallich* (G-DC, n.v.; microfiche, BRI).

Two varieties occur in Australia.

18a. Desmodium heterocarpon (L.) DC. var. **heterocarpon**

Rachis of inflorescence with sparse short erect uncinate hairs.

16



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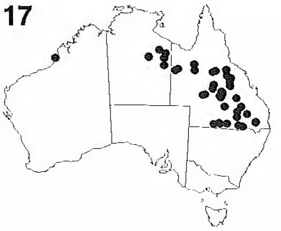

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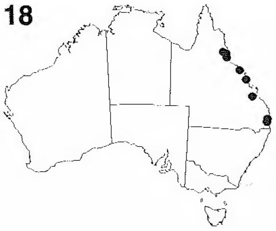

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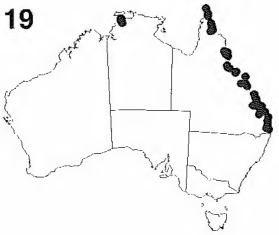

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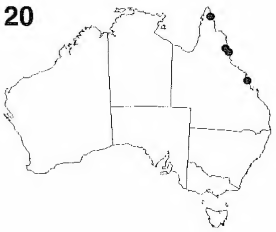

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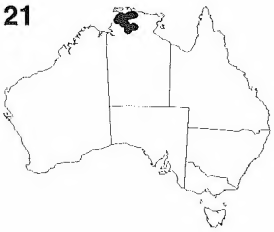

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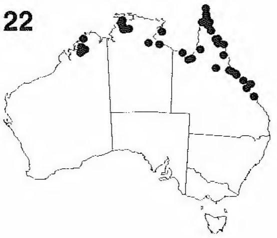

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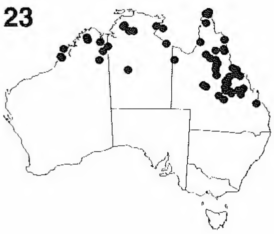

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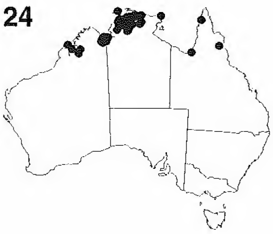

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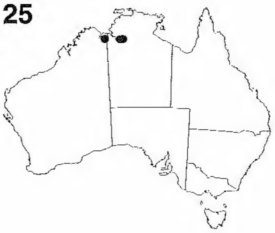

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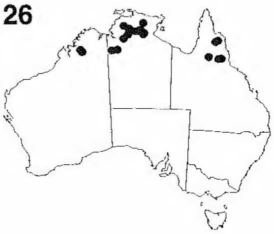

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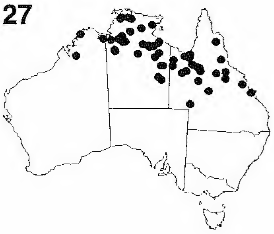

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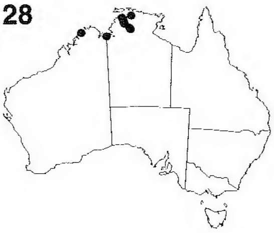

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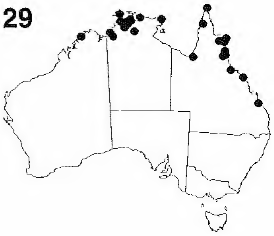

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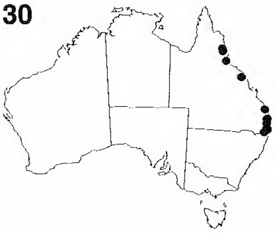

16. *Desmodium brachypodum*
17. *Desmodium campylocaulon*
18. *Desmodium microphyllum*
19. *Desmodium triflorum*
20. *Desmodium heterophyllum*
21. *Desmodium pycnotrichum*
22. *Desmodium trichostachyum*
23. *Desmodium filiforme*
24. *Desmodium brownii*
25. *Desmodium flagellare*
26. *Desmodium hamii*
27. *Desmodium muelleri*
28. *Desmodium glareosum*
29. *Desmodium pullenii*
30. *Desmodium heterocarpon* var. *heterocarpon*

***Selected specimens*: Queensland.** Cook District: Cooktown, Jan 1958, *Blake* 21218 (BRI); Mt Molloy, Apr 1962, *McKee* 9127 (BRI); South Kennedy District: Mt Fox, Sep-Dec 1949, *Clemens* s.n. (ex Univ. Michigan) (BRI, K); Moreton District: Petrie, in 1931, *Blake* s.n. (K). **New South Wales.** Lismore, Mar 1893, *Bauerlen* 985 (NSW).

18b. Desmodium heterocarpon var. **strigosum** Meeuwen, Reinwardtia 6:95 (1962). **Type**: New Guinea, *Kalkman* B.W. 3596 (holo: L, n.v.).

Rachis of inflorescence with dense long straight white or yellowish hairs.

***Selected specimens*: Northern Territory.** Port Essington, *Armstrong* 373 (K); Bamboo Pass, Marrakai road, Mar 1967, *Byrnes* 211 (AD, DNA); Holmes Jungle, 8 miles [13 km] E of Darwin, Mar 1961, *Chippendale* NT 7902 (DNA, MEL). **Queensland.** Cook District: Lockerbie, 10°48'S 142°28'E, Apr 1948, *Brass* 18437 (BRI, CANB); Endeavour River, Jun 1819, *Cunningham* 244 (K, MEL); Moreton District: Buderim, in 1912, *Longman* s.n. (K). **New South Wales.** Along Bonalbo road, north of Bottle Tree village, 28°48'S 152°39'E, May 1973, *Tindale* 2094 (MEL, NSW).

Distribution and habitat: The species is widely distributed in the Old World: Africa, Sri Lanka, India, south-eastern Asia, Malesia and throughout the Pacific. In Australia it ranges from north-eastern New South Wales, through eastern Queensland to the northern part of the Northern Territory, usually in eucalypt communities on well drained soils, occasionally a weed in disturbed situations. Maps 30,31.

Affinities: *Desmodium heterocarpon* is one of the four species of sect. *Nicolsonia* (subg. *Sagotia*) that occur in Australia, but is not closely related to the others. Ohashi (1991) recognised eight infraspecific taxa, including one based principally on flower colour. Both Australian varieties are referred to subsp. *heterocarpon*. *D. heterocarpon* var. *strigosum* is much the commoner of the two, as it is in Africa, New Guinea and the Pacific.

Typification: In the protologue of *Hedysarum heterocarpon*, Linnaeus quoted specific differential characters from his own *Flora Zeylanica* and J. Burman's *Thesaurus Zeylanicus*. The specific differential characters in both these works emphasised that pods on the lower part of the plant are one-seeded (*Flora Zeylanica*: 'leguminibus articulatis: infimo monospermo'; *Thesaurus Zeylanicus*: 'siculis inferioribus solitariis: superioribus articulatis'). Burman's plate cited by Linnaeus does show pods with, in the lower part of the plant, one article, but none of the five specimens in herb. Hermann, only one of which has pods, has a one-seeded pod. It could be argued that since none of Hermann's specimens agrees with the protologue and Burman's plate does, then, if the species is to be lectotypified, Burman's plate should be chosen as the type. Unfortunately the plate is not a good depiction of the species currently accepted as *H. heterocarpon*: the shape of the leaflets is not at all typical and more importantly the fruiting inflorescences are shown as being rather open with the pods not appressed to and hiding the rachis as they usually do. Since other species (for example, *Hedysarum diphyllum, H. pulchellum* and *H. umbellatum*) are so well illustrated in *Thesaurus Zeylanicus* as to be instantly recognisable, one is left with some doubt as to whether the plant illustrated is the *H. heterocarpon* of herb. Hermann. This doubt is deepened by the fact that though I have examined scores of specimens of *H. heterocarpon* collected throughout its range I have not seen a specimen with pods with only one article. In view of this doubt, my general reluctance to typify a name with a plate when a specimen is available, and a desire to preserve nomenclatural stability, I lectotypified *Hedysarum heterocarpon* L. on herb. Hermann vol. 2 fol. 32, the left-hand specimen. The specimen bears flowers, but not pods, and shows both upper and lower surface of leaflets and the characteristically dense inflorescence with the rachis uncinately pubescent.

19. Desmodium strigillosum Schindl., Bot. Jahrb. 54:57 (1916); Gagnepain, Fl. Gen. Indochin. 2: 583 (1920); Ohashi, Ginkgoana 1:233 t.32a, fig. 63, 64 (1973); Dy Phon et al., Fl. Camboge, Laos, Vietnam 27: 129 t.27 (1994). **Type:** Vietnam. Saigon, November 1864, *Lefevre* s.n. (lecto: P, n.v., *fide* Ohashi).

***Selected specimens*: Vietnam.** Onorlei, dans les lieux incults, Nov 1885, *Balansa* Pl. du Tonkin 1250 (K, paralectotype). **Queensland.** Cook District: Andoom Top Camp, 20 km N of Lorim Point, 12°29'S 141°50'E, Mar. 1981, *Morton* AM 1153 (BRI); Cooktown, Jan 1958, *Blake* 20218 (BRI); 2.5 km S of Mt Molloy on road to Mareeba, 16°42'S 145°20'S, Jan 1982, *Clarkson* 6756 & *McDonald* (BRI).

Distribution and habitat: The species has previously been recorded only from south-east Asia (Burma, Cambodia, Laos and Vietnam, *fide* Dy Phon et al.) at altitudes of 700–800m (though the lectotype is evidently from Saigon!). In Queensland it was first collected at Cooktown in 1958 and seems to be a recent introduction. It now occurs at rather low elevations in the Mareeba-Cooktown area and at the extreme north of the west coast of Cape York Peninsula. Map 32.

Affinities: It is probably most closely allied to *D. heterocarpon* from which it differs, most obviously, in its lanceolate leaflets, large flowers and reflexed pods.

20. Desmodium nemorosum F. Muell. ex Benth., Fl. Austr. 2:234 (1864); Ohashi, Ginkgoana 1:218 (1973), excl. var. *whitfordii*; Verdcourt, Man. New Guinea Leg. 403 (1979); *Meibomia nemorosa* (F. Muell. ex Benth.) Kuntze, Rev. Gen. 1:198 (1891). **Type:** Brisbane River, *Mueller* (syn: K); Pine River, *Fitzalan* (syn: K); sine loc., *Leichhardt* (syn: K; iso?: NSW).

Desmodium nemorosum var. *simplex* Schindl., Rep. sp. nov. reg. veg. 21:10 (1925). **Type:** none designated.

Desmodium nemorosum subvar. *eboracense* Schindl., Rep. sp. nov. reg. veg. 21:10 (1925). **Type:** Cape York, *Daemel* (iso: BM).

Desmodium nemorosum var. *novoguineense* Kaneh. & Hatus., Bot. Mag. Tokyo 56:366 (1942). **Type:** New Guinea. Vogelkop, Waren, 60 miles [96 km] S of Manokwari, Mar 1940, *Kanehira & Hatusima* 12930 (holo: FU, n.v.; photo: K).

Desmodium archboldianum E.G. Baker, Brittonia 2:318 (1937). **Type:** Papua New Guinea. Western District: Wuroi, Oriomo River, Jan 1934, *Brass* 5732 (holo: BM; iso: BRI, L).

Selected specimens: **Queensland.** COOK DISTRICT: Newcastle Bay [10°49'S 142°26'] May 1948, *Brass* 18763 (BRI, CANB); NORTH KENNEDY DISTRICT: Mt Fox [18°51'S 145°48'E], Dec 1949, *Clemens* (CANB); MORETON DISTRICT: Bellthorpe–Jimna road, 26°44'S 152°35'E, alt. 600m, Jan 1990, *Weston* 1469 & *Richards* (BRI, NSW); Tamborine Mtn, Jan 1916, *White* s.n. [AQ 097953] (BRI). **New South Wales.** 5 miles [8 km] N of Iluka, Jun 1966, *Boyd & McGillivray* 2008 (NSW); Port Macquarie, May 1819, *Cunningham* 41 (K) & Feb 1898, *Boorman* (NSW); Camden Haven, Jan 1882, *Betche* (NSW 105278).

Distribution and habitat: *Desmodium nemorosum* extends from New Guinea through coastal parts of eastern Queensland to north-eastern New South Wales, in higher rainfall areas in eucalypt open-forest and on margins of rainforest. Though widespread, it is nowhere common, and appears to be absent from central Queensland between about 20°S and 25°S. Map 33.

Affinities: The species differs from *D. heterocarpon* the other species of sect. *Nicolsonia* mainly in its elongate articles 5–7 mm long and its more elongate leaflets. Like *D. heterocarpon, D. nemorosum* shows a wide variation in size in both foliar and floral parts, but unlike *D. heterocarpon* it cannot be divided into infraspecific taxa. *D. nemorosum* subvar. *whitfordii* Schindl. (*D. nemorosum* var. *whitfordii* (Schindl.) Ohashi), syntypes of which I have seen (herb. Kew), is best considered a distinct species with a restricted range in the Philippines some 2500 km from Vogelkop the nearest known occurrence of *D. nemorosum* in New Guinea. It has distinctly ovate leaflets with dense long appressed silky hairs on their undersides. Specimens from Australia referred to *D. nemorosum* var. *whitfordii* by Ohashi are well within the normal range of variation of *D. nemorosum* var. *nemorosum*.

Desmodium whitfordii (Schindl.) Pedley, **comb. nov.**

Desmodium nemorosum subvar. *whitfordii* Schindl., Rep. sp. nov. reg. veg. 21:10 (1925). **Types:** Philippines. Luzon: Bataan Prov., Lamao River, Mt Marweles (Herb. Bur. Gov. Lab. No. 227 leg. *H.N. Whitford*; Herb. Bur. Sci. No. 7611 leg. *E.D. Merrill.*) (isosyn: K).

21. Desmodium tiwiense Pedley, **sp. nov.**, affinis *D. nemoroso* F. Muell. ex Benth. a qua foliis semper unifoliolatis, foliolis orbicularibus (non ovatis ellipticisve) infra minor dense pubescentibus et venis lateralibus paucioribus ornatis et leguminibus margine inferiore minor valde inciso et articulis paucioribus differt. **Typus:** Northern Territory: Bathurst Island, Runku, 11°36’59”S 130°16’35”E, 27 March 1995, *I.D. Cowie* 5424 (holo: DNA; iso BRI, K, & (*n. v.*) CANB, L, MEL, NSW, PERTH).

Perennial trailing herb; stems terete with indumentum of dense spreading or ascending white hairs (to 0.7 mm long). Leaves 1-foliolate; stipules brown scarious, long-pointed, somewhat asymmetrical at the base, 7–10 mm long, 1.2–2 mm wide; petiole 12–16 mm long; leaflets more or less orbicular, cordate at the base, obtuse at the apex, glabrous above, moderately appressed pubescent below, with c. 7 pairs of lateral veins not reaching the margin, (25–)30–36 mm long, (25–)28–32 mm wide; pulvinuses 1–1.5 mm long; stipels filiform 3–4 mm long. Inflorescences terminal, open, to 12 cm long, rachis pubescent with moderately dense, slightly retrorse, uncinate hairs; flowers in pairs subtended by a deciduous ovate acuminate bract c. 3 mm long, secondary bracts and bracteoles absent; pedicels 2–3 mm long. Flowers: calyx c. 3 mm long, very shortly uncinately pubescent and with a few long hairs at the base, tube c.1 mm long, all lobes triangular c. 2 mm long, the upper shortly bifid at the tip; corolla white or yellowish, standard orbicular, emarginate at the top, 5.5 mm long, 6.5 mm wide, wings oblong c. 5 mm long (including claw *c.*1 mm), keel petals about as long as wings; stamens rather stout; ovary appressed pubescent. Pod to 25 mm long with 5 or 6 articles, upper suture straight or slightly sinuate, not notched between articles, lower shallowly indented (less than ¼ width of pod) between articles; articles quadrate 3–3.5 mm long and wide, with sparse uncinate hairs, denser on margins, transversely reticulately nerved; seed *c.* 2 mm long and 1.5 mm wide with a small rim aril.

***Other specimens (all DNA)*: Northern Territory.** Melville Island, 11°28’S 130°30’E, Feb 1987, *Fensham* 445; Cape Gambier, Melville Is., 11°52S 130°40’E, May 1988, *Fensham* 828; Melville Is., 11°42’S 130°42E, Apr 1987, *Fensham* 508; Melville Is., Penell Beach to MacClear Creek Rd, Jun., 11°49’S 130°54’E, Jan 1992, *Leach* 2938 & *Cowie*.

***Distribution and habitat*:** The species has a limited geographic range, restricted to Bathurst and Melville Islands in the extreme north-west of the Northern Territory where it occurs in eucalypt communities on sandy or gravelly soils. Map 34.

***Affinities*:** *Desmodium tiwiense* is most closely related to *D. nemorosum* which usually has trifoliolate leaves, narrower leaflets more densely pubescent beneath with more lateral veins, the lower margin of the pod more deeply incised, and larger pod articles.

***Etymology*:** Bathurst and Melville Islands are the traditional home of the Tiwi people and are often known as the Tiwi Islands. The specific epithet is a combinationof *tiwi*, and the Latin suffix (neuter) -*ense*, place of origin.

22. Desmodium velutinum (Willd.) DC., Prodr. 2:328 (1825); Schubert, Fl. Congo Belge 5:194 (1954) & Fl. Trop. East Africa. Legum.: Papilion.: 466 (1971); Ohashi, Ginkgoana 1:192 (1973) & Fl. Camb. Laos Vietn. 27:117 (1994) ; Verdcourt, Kirkia 9:518 (1974), Manual New Guinea Leg. 411 (1979); Pedley, Rev. Handb. Fl. Ceylon 10:183 (1996); *Meibomia velutina* Willd., Sp. Pl. 3(2):1174 (1802). **Type:** herb. Willdenow 13763 (holo: B; microfiche, BRI).

***Selected specimens*: Northern Territory.** Mt Bundy, 12°52’S 131°38’E, Apr 1969, *Byrnes* 1486 (DNA, K); 9 km N of Cannon Hill, 12°17’S 132°55’E, Jun 1983, *Russell-Smith* 699 (DNA); Bamboo Pass, 12°55’S 131°15’E, Mar 1968, *Byrnes* 213 (AD, DNA).

***Distribution and habitat*:** In Australia confined to the extreme north-west of the Northern Territory where it occurs in eucalypt communities and on margins of closed communities. It may have been introduced into Australia in recent years as all collections have been made since 1965. It is widespread in Africa, south-east Asia and Malesia. Map 35.

***Affinities*:** With *D. gangeticum* it is the only representative of sect. *Heteroloma*, but it is not particularly closely related to *D. gangeticum* or any other species of the section. Ohashi recognised two subspecies, one with two varieties. Australian specimens are referable to *D. velutinum* var. *velutinum*.

23. Desmodium gangeticum (L.) DC., Prodr. 2:327 (1825); Schubert, Fl. Congo Belge 5:196 (1954), J. Arn. Arb. 44:294 (1963) & Fl. Trop. East Africa. Legum. Papilion. 467. t. 65 (1971); Ohashi, Ginkgoana 1:184 (1973) & Fl. Camb. Laos Vietn. 27:121 (1994); Verdcourt, Man. New Guinea Leg. 397 (1979); Pedley, Rev. Handb. Fl. Ceylon 10:182 (1996); *Meibomia gangetica* (L.) Kuntze, Rev. Gen. 1:196 (1891); *Hedysarum gangeticum* L., Sp. Pl. 746 (1753). **Type:** *Hedysarum* no. 13 (LINN).

***Selected specimens*: Western Australia.** Junction of Brockman R. & Calder R., 16°17'S 125°00'E, May 1983, *Milewski* (K, PERTH). **Northern Territory.** Victoria River, *Mueller* (K); 43 miles [69 km] ENE of Pine Creek, Mar 1965, *Lazarides & Adams* 193 (CANB); 5 miles [8 km] S of Batchelor, Mar 1965, *Muspratt* 112 (AD, DNA, MEL, NSW). **Queensland.** North Kennedy District: Ayr, 19°34'S 147°24'E, Jun 1951, *Kleinschmidt* K145 (CANB); Port Curtis District: Gladstone, *Dietrich* 41 (MEL); Moreton District: near Sidling Creek, Petrie 18 miles [29 km] N of Brisbane, Mar 1931, *Blake* 2349 (BRI, K).

***Distribution and habitat*:** *Desmodium gangeticum* has a wide geographic range in the Old World: Africa, Sri Lanka, India, Indo-China and Malesia. In Australia it is found from north-eastern New South Wales, through eastern Queensland to the northern part of the Northern Territory and the Kimberley region of Western Australia. It is nowhere common and little is known of its ecology except that it occurs in eucalypt communities; it may have been introduced in some places. Map 36.

***Affinities*:** Ohashi referred *D. gangeticum* with *D. velutinum* to sect. *Heteroloma* Benth. though the relationship between the two is not close. The nearest relative of *D. gangeticum* is possibly *D. pryonii* DC. which is restricted to Sri Lanka and the extreme south of Peninsular India.

24. Desmodium rhytidophyllum F. Muell. ex Benth., Fl. Austr. 2:233 (1864); *Meibomia rhytidophylla* (F. Muell. ex Benth.) Kuntze, Rev. Gen. 1:198 (1891). **Types:** Port Jackson, *Brown* (syn:K); Parramatta, *Woolls* (syn:K, MEL); between Burnett and Dawson, *Mueller* (syn:K); Queensland (cited by Bentham as 'near Rockhampton'), *Dallachy* (syn: K).

Trailing perennial herb; branchlets with indumentum of brown spreading hairs c. 0.5 mm long; stipules deltoid or ovate acuminate, 3–5 mm long, 1–2 mm wide, densely hairy outside, glabrous, striate inside. Leaves 3-foliolate; petiole with indumentum of branches, 8–30 mm long, rachis 3–9 mm long, petiolules 1–2 mm long, stipels 0.7–1.7 mm long; terminal leaflets rhomboid (rarely obovate or orbicular), obtuse or rarely emarginate, discolorous with ± dense spreading hairs on both surfaces, becoming sparser on upper surface, 17–45(–55) mm long, (10–)15–30 mm wide, (1–)1.5–1.8(–2.1) times longer than wide, lateral ones smaller and often oblique 14–35(–40) mm long, 10–25 mm wide, 1.3–1.8 times longer than wide. Inflorescence terminal, to 25 cm long, rather open, axis with dense indumentum of hooked hairs; flowers in fascicles of 2 or rarely 3; primary bracts 2–3 mm long, secondary bracts c. 1 mm long; pedicels 2–4 mm long. Flowers pink or purplish: calyx 4-lobed, 3–3.3 mm long, the tube hirsute 1–1.3 mm long, the lobes c. 2 mm long, the lower and lateral ones subulate, the upper wider, minutely bifid at the tip; corolla standard obovate, sometimes shortly clawed, 4.3–5.3 mm long, 4–4.5 mm wide, wings 3.7 mm long, 1.5 mm wide, somewhat auriculate, on a claw c. 1.5 mm long, keel petals 3.5–4 mm long, 1.5–2 mm wide on a claw 1.5–2 mm long; stamens diadelphous; ovary with indumentum of hooked hairs. Pod straight with up to 6 articles, upper suture and lower margin incised, the lower slightly more than the upper, the isthmus c. ½ width of articles; articles transversely ovate, 3.5–4 mm long, 2.5–3 mm wide, reticulately veined with moderately dense indumentum of uncinate hairs. Mature seeds not seen.

***Selected specimens*: Papua New Guinea.** Central District: Port Moresby subdistrict, Lake Myola swamp grassland, 9°9'S 147° 43'E, Sep 1973, *Croft & Lelean* NGF 34642 (BRI). **Northern Territory.** Gimbat, source of South Alligator River, 13°45'E 132°48'E, *Russell-Smith* 734 (DNA). **Queensland.** Cook District: Tolga, 17°13'S 145°29'E, Apr 1962, *McKee* 9405 (CANB, K, NSW); Leichhardt District: Blackdown Tableland, c. 23°50'S 149°00'E, Apr 1971, *Henderson* et al. 671 (BRI, K, MEL); Burnett District: Eidsvold, 25°22'S 151°07'E, Apr 1963, *McKee* 10219 (CANB, NSW). **New South Wales.** Brunswick Heads, Feb 1971, *O'Hara & Coveny* 3476 (K, NSW); Colo River Bridge, c. 12 miles [19 km] N of Windsor, Mar 1967, *Constable* 7347 (K, NSW); Huskisson, Jervis Bay, Feb 1941, *E.C. McDonald* 143 (K).

***Distribution and habitat*:** The species ranges from the Atherton Tablelands of north Queensland through coastal and subcoastal areas to the South Coast District of New South Wales, with isolated occurrences in the Northern Territory and in Papua New Guinea. It is often a prominent member of the ground layer vegetation of open eucalypt communities, usually on well drained soils. It also occurs in New Caledonia. Map 37.

***Affinities*:** As Bentham noted in his protologue *D. rhytidophyllum* has some affinity with *D. varians*, but the relationship is not close. It is however, close to *D. tenax* (which Verdcourt (1979) treated as a subspecies of *D. rhytidophyllum*) and *D. macrocarpum* but all are rather isolated among species of sect. *Heteroloma* Benth.

25. Desmodium tenax Schindl., Rep. sp. nov. reg. veg. 21:10 (1925). **Type**: Rockingham Bay, *Dallachy* (n.v.).

D. rhytidophyllum subsp. *acutifoliolum* Verdc., Kew Bull. 32:250 (1977) & Man. New Guinea Leg. 406 (1979). **Type:** Papua New Guinea. Western District: Moreshead Subdistrict: Wassi Kussi River, Arufi, Jul 1968, *Henty & Katik* NGF 38667 (holo: K).

Sprawling shrub to c. 1 m tall; branchlets with indumentum of brown spreading hairs similar to those of *D. rhytidopyhyllum*; stipules lanceolate acute, to c. 6 mm long, densely hairy outside, glabrous inside. Leaves trifoliolate; petiole 10–40 mm long, rachis 8–20 mm long; leaflets ovate with a long acute apex, upper surface with sparse, appressed to ascending hairs, lower surface with moderately dense usually ascending hairs; terminal leaflet 65–105 mm long, 40–55 mm wide, 1.5–2.3 times longer than wide, laterals less attenuate, smaller, 42–60 mm long, 22–35 mm wide, 1.3–2 times longer than wide; pulvinuses 2–2.5 mm long, stipels 1.5–2.5 mm long. Inflorescences terminal and in upper axils, to 200 mm long, rachis with indumentum of hooked hairs; fascicles of usually 2 flowers, primary bract 2–3 mm long, secondary c. 1.5 mm, both deciduous, bracteoles absent; pedicels to c. 3 mm long. Flowers pink or purple, similar to those of *D. rhytidophyllum* though perhaps standard smaller. Pods indented on both upper and lower sutures, the lower more deeply, isthmus about $^1/_3$ width of pod, of up to 6 articles, each triangular, 5.5–8 mm long, 3.4–4 mm wide, reticulately veined with sparse uncinate hairs; seed (only 1 measured) 3.5 mm long, 2.2 mm wide.

***Selected Specimens*:** **Queensland.** Cook District: Lockerbie Scrub, 10°47'S 142°29'E, Feb 1990, *Forster* PIF 6325 (BRI); Iron Range [12°44'S 143°17'E] Jun 1948, *Brass* 19320 (BRI, CANB, K); McIlwraith Ra., 13°42'S 143°18'E, Jun 1992, *Forster* PIF 10247 (BRI); North Kennedy District: Mt Fox [18°51'S 145°48'E], Nov 1949, *Clemens* s.n. [AQ 417008] (BRI).

***Distribution and habitat*:** The species ranges from southern New Guinea to Mt Fox, a little north of Townsville, Queensland. It has been collected in eucalypt-Melaleuca communities, but is evidently rare. Map 38.

***Affinities*:** As Schindler noted in the protologue of the species, it differs from *D. rhytidophyllum* on its larger acute leaflets and larger pods, and they are obviously closely related.

26. Desmodium macrocarpum Domin, Biblioth. Bot. 89:214 (1926). **Type:** in xerodrymio ad opp. Jericho, Mar 1910, *Domin* 4744 (holo: PR 527366).

Subshrub woody at the base, with ascending stems to c. 0.5 m tall; branchlets with rather dense indumentum of erect, slightly uncinate, stiff hairs to 0.5 mm long; stipules ovate, acuminate, 5–6 mm long, c. 3 mm wide, longitudinally veined, pubescent. Leaves 1- or rarely 3-foliolate; petiole 25–50 mm long; leaflets ovate or rhombic (or laterals oblong-orbicular), obtuse, mucronulate at the apex, truncate or subcordate at the base, with moderately dense short stiff hairs on both upper and lower surfaces; terminal leaflets 25–30 mm long, 20–40 mm wide, 1.2–1.6 times longer than wide, laterals about half as large; pulvinuses 2–3 mm long, stipels 2.5–4 mm long, setaceous. Inflorescences terminal and in upper axils, to c. 200 mm long, rachis with indumentum similar to that of branchlets; fascicles of 2 flowers; primary bracts similar to stipules, 3–5 mm long, 1.5 mm wide, secondary bracts absent or early deciduous; bracteoles absent; pedicels 2–3 mm long. Flowers white or pale mauve; calyx 4-lobed, c. 4 mm long, pubescent with short stiff hairs, lobed to about the middle, the upper wider than the others, notched at the apex; standard orbicular, tapered to the base but not distinctly clawed, 6–6.5 mm long, 6.5–7 mm wide; wing 6–6.5 mm long, 2–3 mm wide including a distinct claw; keel petals about as long as the wings, slightly wider; stamens diadelphous; ovary with dense indumentum of short uncinate hairs. Pod straight with up to 4 articles, upper suture straight, lower margin incised to c. $^4/_5$ width of pod; articles ± triangular, 9–10 mm long, 5–6 mm wide, with dense indumentum of short stiff uncinate hairs. Seeds brown, ± oblong, 5–6 mm long, 3–3.5 mm wide, with a distinct rim aril.

***Selected specimens*:** **Queensland.** North Kennedy District: 40-mile scrub, 18°15'S 144°45'E, Feb 1972, *Irvine* 165 (BRI, QRS); Leichhardt District: 'Redlands' 5 km W of Balfes Creek, [approx 20°15'S 145°55'E], Apr 1977, *Rebgetz* 355 (BRI); 'Kooralbyn' c. 24 km SSW of Duaringa, 23°57'S 149°37'E, Mar 1984, *Anderson* 3660 & 3661 (BRI); Burnett District: 'Narayen' near Mundubbera, May 1988, *Hacker* JBH 870 (BRI).

***Distribution and habitat*:** *Desmodium macrocarpum* is an uncommon plant known from several widely separated localities in eastern Queensland. It is found on sandy or loamy soil, sometimes shallow, usually in communities of *Eucalyptus crebra* F. Muell, sometimes with *Acacia shirleyi* Maiden. Map 39.

***Affinities*:** As Domin stated the species is related to *D. rhytidophyllum*, but has usually unifoliolate leaves, stiffer hairs and much larger pod articles.

27. Desmodium gunnii Benth. ex J.D. Hook., Fl. Tasmanicae 1:101 (1856); *D. varians* var. *gunnii* (Benth. ex J.D. Hook.) Benth., Fl. Austr. 2:233 (1864). **Type:** Tasmania, *Gunn* 243 (lecto: K, see below; isolecto: BM).

Sprawling or somewhat ascending perennial, sometimes rooting at the nodes; branchlets terete, glabrous or with a few appressed hairs; stipules triangular, striate, 2–4 mm long, 1–2.5 mm wide at base. Leaves trifoliolate, petioles 10–30 mm long, rachis minute or to 1 mm long, petiolules (i.e. pulvinuses) 0.6–1 mm long, stipels setaceous, 0.5–2 mm long, those of lateral leaflets longer than those of terminal one; leaflets cuneate and truncate at the apex, or rarely obovate and obtuse, the terminal 6–20 mm long, 7–11 mm wide, 0.8–1.5 times longer than wide, the laterals usually smaller, 6–18 mm long, 6.5–13 mm wide, 0.8–1.6 times longer than wide, subglabrous, a few hairs on veins on lower surface. Inflorescences terminal or in the upper axils, to 16 cm long, open, flowers solitary, bracts persistent, stipule-like to 1.7 mm long, pedicels with indumentum of hooked hairs, 1.5–7 mm long, bracteoles none. Flowers: calyx tube campanulate 1–1.2 mm long, the lobes broad 0.7–1 mm long; corolla pink or lavender, standard 3–3.3 mm long, the other petals longer, c. 3.5 mm long; stamens diadelphous; ovary appressed pubescent. Pods with up to 6 articles, the upper suture indented between the articles, the lower more deeply so; articles oblong, 4–5 mm long, 2–2.5 mm wide, with dense indumentum of spreading hooked hairs. Mature seeds not seen.

***Selected specimens*:** **Queensland.** Port Curtis District: Many Peaks Range, 24°10'S 151°17'E, Jun 1977, *Crisp* 2752 (CANB); Gladstone, *Dietrich* 215 (MEL); Moreton District: Tamborine Mtn, Mar 1947, *Clemens* (K). **New South Wales.** Brindabella Range, 35°19'S 148°50'E, Jan 1977, *Crisp* et al. 2471 (CANB); Shoalwater River Gorge, 34°48'S 150°12'E, Feb 1974, *Pullen* 8794 (CANB). **Victoria.** Mallacoota Inlet, Dec 1969, *Beauglehole* 32372 & *Finck* (MEL); Sherbrooke, 37°54'S 145°21E, Mar 1977, *Gullan* 62 & *Opie* (MEL).

***Distribution and habitat*:** The species ranges from Papua New Guinea (one collection) through coastal parts of mainland eastern Australia to Tasmania, commonly in eucalypt open forest, usually in shady situations. It also occurs in New Caledonia. Map 40.

***Affinities*:** *Desmodium gunnii* is close to *D. varians* to which Bentham referred it as a variety. It differs in the structure of its pod and its extremely short leaf rachis. Leaflets of *D. varians*, when extremely short, approach those of *D. gunnii* in size and shape, but whereas the leaves of *D. gunnii* are subdigitate with the leaf rachis never exceeding 1 mm, those of *D. varians* are distinctly pinnate with the leaf rachis at least 1 mm longer and usually considerably more.

Typification: Hooker cited *Gunn* 243 as the type. In herb. K two sheets have been segregated as type material, one from Herbarium Hookerianum, the other from Herbarium Benthamianum. Thirty-two fragments are mounted on the sheets. Annotations and labels indicate that, in part, they represent *Gunn* 243, but more than one collection (including some by Milligan) is represented. Unfortunately five of the fragments are of *D. varians*. Despite the mixed material, Hooker's description applies to *D. gunnii*. I have therefore lectotypified the name by the fragments mounted on the sheet 'Herbarium Hookerianum 1867', excepting two sizeable fragments of *D. varians* on the sheet. This sheet has pinned to it a note and a field label both in Gunn's hand identifying it as his n. 243. The isolectotype at BM consists of six fragments all from Circular Head; none is *D. varians*.

28. Desmodium varians (Labill.) G. Don, Gen. Hist. Dich. Plants 2:298 (1832); Benth., Fl. Austr. 2:233 (1861); *Meibomia varians* (Labill.) Kuntze, Rev. Gen. 1:198 (1891); *Hedysarum varians* Labill., Sert. Austro-cal. 71 t. 71 (1824). **Type:** none designated.

Desmodium varians var. *angustifolium* Benth., Fl. Austr. 2:233 (1864). *Desmodium spartioides* DC., Prodr. 2:337 (1825). **Type:** ex herb. Lambert (G–DC, n.v., microfiche: BRI).

Desmodium dietrichiae Domin, Biblioth. Bot. 89(3): 213 (1926). **Type:** prope Brisbane River, Australia or., *Dietrich* 1450 (lecto: PR 527357, chosen here).

Sprawling perennial or tufted annual with stems arising from perennial rootstock; branchlets terete, glabrous or with a few appressed hairs; stipules deltoid or ovate acuminate, 2–5.5 mm long. Leaves trifoliolate, petiole 5–10 mm long, rachis 2–4.5 mm long; leaflets lanceolate, oblong or occasionally oblanceolate, rounded or cuneate at the base, obtuse or slightly retuse at the apex, usually a few appressed hairs on the veins beneath; terminal leaflet 5–35 mm long, 4–5.5(–7) mm wide, 1–8.5 times longer than wide, lateral leaflets smaller, 3.5–26 mm long, 3–4.5(–6) mm wide, 1.2–8 times longer than wide; pulvinuses 0.5–1.5 mm long, stipels 0.4–1 mm long. Inflorescence terminal to c. 15cm long in flower, elongating in fruit, the rachis glabrous except for some uncinate hairs near the tip, fascicles of 1–3 flowers, subtended by primary bract 1.5–3.5 mm long, deciduous; secondary bract usually 0.7–1 mm long, deciduous; bracteoles absent; pedicels 3–9 mm long with indumentum of uncinate hairs. Flowers: calyx 4-lobed, covered with short uncinate and longer straight hairs, tube 1.2–1.5 mm long, the lobes all of about equal length, 1.2–1.6 mm long, the upper ± entire or divided to about the middle; corolla pink or purplish; standard orbicular, about 6 mm long and wide, wings about 5 mm long, 2.5 mm wide, with claw c. 2 mm long, keel petals somewhat shorter than the wings. Pods with 4–6 articles, the upper suture thickened, somewhat undulate, the lower deeply indented, the isthmus ⅓–½ width of pod; articles 3.5–4.2 mm long, 2.7–3.8 mm wide, with moderate to dense indumentum of uncinate hairs; seeds about 2.5 mm long, 1.6 mm wide with a distinct rim aril.

Selected specimens: **New Caledonia.** Wagap, *Viellard* 366 (K). **Queensland.** BURKE DISTRICT: 13 km N of turn-off to 'Gregory Springs', 19°40'S 144°14'E, May 1988, *Pullen* 11248 (CANB); LEICHHARDT DISTRICT: 8 miles [13 km] S of Springsure, Oct 1964, *Adams* 1391 (BRI, CANB, K); MORETON DISTRICT: Blunder Creek near Brisbane, Oct 1930, *Hubbard* 4713 (BRI, K). **New South Wales.** Yamba, 29°27'S 153°22'E, Feb 1973, *Tindale* 2038 (NSW); 30 miles [48 km] S of Tamworth, 31°31'S 150°51'E, Feb 1941, *Roe* R61 (CANB); Canberra, Nov 1960, *McKee* 7672 (CANB, K). **Victoria.** Dandenong Ranges, Belgrave, Dec 1932, *Willis* (MEL); Upper Turnback Creek, 37°06'S 148°22'E, Feb 1980, *Walsh* 352 (MEL). **Tasmania.** South Esk, in 1887, *Oakden* (MEL); without definite locality, *Mueller* (MEL).

Distribution and habitat: The species occurs over a wide area of eastern Australia, ranging from Tasmania through coastal districts of Victoria and subcoastal and coastal districts of New South Wales to north-central Queensland, usually on well drained soils in eucalypt communities. It also occurs in New Caledonia. Map 41.

Affinities: *Desmodium varians* is closely related to *D. gunnii* which Bentham treated as a variety of *D. varians*. The two are sympatric in many coastal areas but *D. gunnii* usually occurs in moister shaded situations. The species is variable and there are two different growth forms. In coastal areas the plant usually sprawls among grass but in inland areas which often have a marked dry season it often forms multistemmed tufts from a woody base. The latter may be merely first growth in response to rain, but possibly Bentham should be followed and two taxa recognised .

29. Desmodium tortuosum (Sw.) DC., Prodr. 2:332 (1825); Schubert, Flora Trop. East Africa. Legum. Papilion. 474 (1971); Verdcourt, Kirkia 9:256 (1974) & Man. New Guinea Leg. 408 (1979); Long & Lakela, Fl. Trop. Florida 487 (1971); Correll & Correll, Fl. Baham. Arch. 64 (1982); Liogier, Fl. Española 3:197 (1985); Howard, Fl. Lesser Antilles 4(1):482 (1988); Green, Fl. Austral. 49:179 (1994); Pedley, Rev. Handb. Fl. Ceylon 10:191 (1996); *Meibomia tortuosa* (Sw.) Kuntze, Rev. Gen. 1:198 (1891); *Hedysarum tortuosum* Sw., Prodr. Veg. Ind. Occ. 107 (1788). **Type:** Jamaica, *Swartz* (holo: S, *fide* Schubert, Howard, n.v.).

Desmodium purpureum (Miller) Fawcett & Rendle, Fl. Jamaica 4:36 (1920), non Hook. & Arn. (1832); *Hedysarum purpureum* Miller, Gard, Dict. ed. 8 no. 6 (1768). **Type:** Mexico, Vera Cruz, in 1730, *Houston* (holo: BM).

Selected specimens: **Western Australia**. Mitchell Plateau, 14°49'S 125°51'E, May 1978, *Kenneally* 6801 (K, PERTH). **Northern Territory.** Darwin, Oct 1946, *Blake* 17311 (BRI, K); Katherine, 14°28'S 132°16'E, Apr 1977, *Pullen* 10607 (CANB) & *Dunlop* 4182 (DNA). **Queensland.** COOK DISTRICT: Yorke Is., 9°45'S 143°24'E, Oct 1981, *Clarkson* 3972 (BRI, K, MBA); MORETON DISTRICT: Gatton, Apr 1947, *Everist* 2965 (BRI, K). **New South Wales.** Braidwood District, Jan 1885, *Bauerlen* 393 (MEL).

Distribution and habitat: *Desmodium tortuosum* is a native of subtropical and tropical America now naturalised in Africa and Asia. It was probably introduced to Australia as a green-manure crop but is widely (though not commonly) naturalised in high rainfall areas in eastern coastal areas and in the north-west, usually on roadsides. Map 42.

Affinities: Because of its twisted pods *D. tortuosum* is unlikely to be confused with any other species known from Australia, but it is closely related to the tropical American *D. procumbens* (Mill.) Hitchc. and the African *D. ospriostreblum* Chiov. which is probably only a variant of *D. procumbens*. The terminal article of the pods of *Clarkson* 3972 is about twice as large as the other articles, an attribute which allegedly distinguishes *D. ospriostreblum* from *D. procumbens* (Schubert 1971).

30. Desmodium uncinatum (Jacq.) DC., Prodr. 2:331 (1825); Schubert, Field Mus. Nat. Hist. Publ. Bot. 13(3):412 (1943); Fosberg, Micronesica 4:257 (1968), pro syn.; Verdcourt, Man. New Guinea Leg. 411 (1979); *Meibomia uncinata* (Jacq.) Kuntze, Rev. Gen. 1:197 (1891); *Hedysarum uncinatum* Jacq., Pl. Hort. Schoenbr. 3:27 t. 298 (1798). **Type:** 'Crescit in Caracas' (W?, n.v.).

Selected specimens: **Queensland.** WIDE BAY DISTRICT: 3 km NE of Kin Kin, 26°15'S 152°54'E, May 1976, *Jacobs* 2520 & *Rodd* (K, NSW); MORETON DISTRICT: cultivated CSIRO Experimental Farm, Samford, Apr 1960, (BRI, K). **New South Wales.** 4.6 miles [7.4 km] from Sheep Station sign on Lynch's Creek road, Wiangaree State Forest, 28°23'S 153°06'E, May 1973, *Tindale* 2114 (NSW).

Distribution and habitat: *Desmodium uncinatum* ("silver-leaf Desmodium") was deliberately introduced into Australia as a forage crop and has become naturalised in high rainfall areas of south-eastern Queensland and north-eastern New South Wales, usually on loamy volcanic soils. Map 43.

Affinities: Schubert, Fosberg and and Ohashi (1990) commented on the confusion of the identities of *D. uncinatum, D. intortum* and *D. limense* Hook. Contrary to Fosberg's treatment of *D. uncinatum* as a synonym of *D. intortum*, Schubert's and Verdcourt's recognition of them as distinct species is reasonable. The differences given in the key hold for South American as well as Australian and New Guinea specimens. Ohashi (1990) applied the

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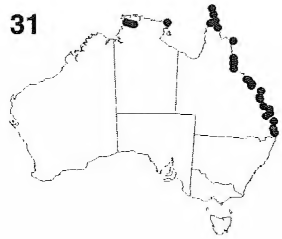

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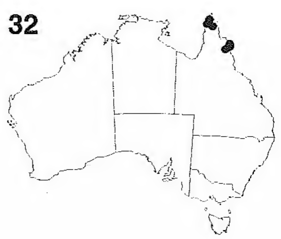

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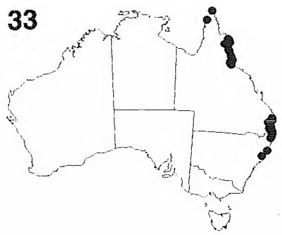

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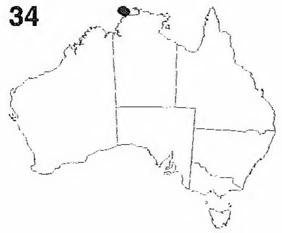

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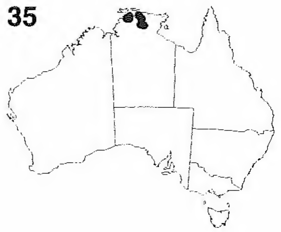

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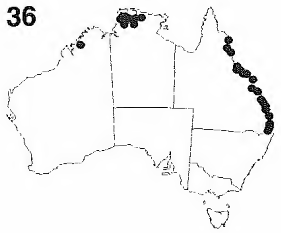

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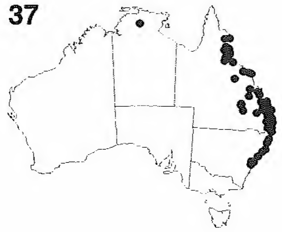

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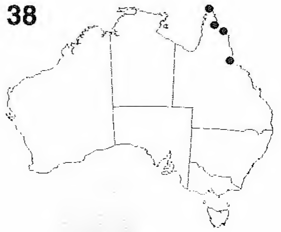

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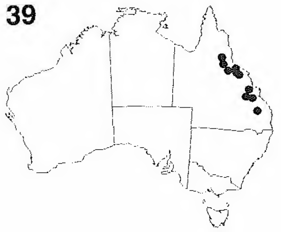

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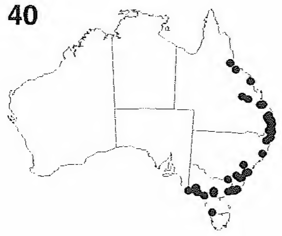

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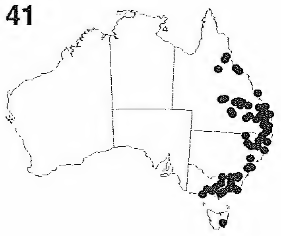

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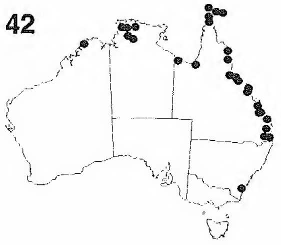

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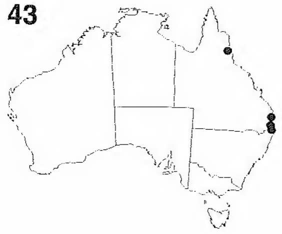

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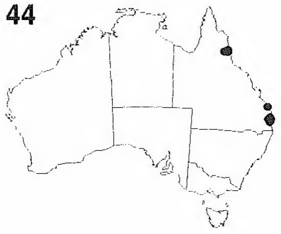

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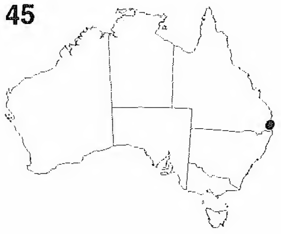


31. *Desmodium heterocarpon* var. *strigosum*
32. *Desmodium strigillosum*
33. *Desmodium nemorosum*
34. *Desmodium tiwiense*
35. *Desmodium velutinum*
36. *Desmodium gangeticum*
37. *Desmodium rhytidophyllum*
38. *Desmodium tenax*
39. *Desmodium macrocarpum*
40. *Desmodium gunnii*
41. *Desmodium varians*
42. *Desmodium tortuosum*
43. *Desmodium uncinatum*
44. *Desmodium intortum*
45. *Desmodium incanum*

name *D. sandwicense* to plants growing in Hawai'i. The correct name for the species (if it is different from *D. uncinatum*) is the earlier *D. pilosiusculum* DC.

31. Desmodium intortum (Mill.) Urban, Symbol. Antill. 8:292 (1920); Schubert, Field Mus. Nat. Hist. Publ. Bot. 13(3):427 (1943); Verdcourt, Man. New Guinea Leg. 400 (1979); McVaugh, Fl. Novo-Galiciana 5:470 (1987); Ohashi, Man. Fl. Pl. Hawai'i 667 (1990); *Meibomia intorta* (Mill.) Blake, Bot. Gaz. 78:286 (1924); *Hedysarum intortum* Mill., Gard. Dict. ed. 8. no. 11 (1788). **Type:** Jamaica, *Houston* (?BM, n.v.)

***Selected specimens*: Queensland.** MORETON DISTRICT: Nambour, Jan 1972, *Everist* [AQ 4279] (BRI, K); Brisbane Botanic Gardens, Dec 1975, *Verdcourt* s.n. (K). **New South Wales.** Wiangaree State Forest, 28°23'S 152°06'E, May 1973, *Tindale* 2116 (NSW).

***Distribution and habitat*:** Like *D. uncinatum, D. intortum* ('green-leaf Desmodium") was introduced into Australia as a forage plant and has become naturalised, though not as frequently as *D. uncinatum*. Map 44.

***Affinities*:** The affinities of the species are commented on under *D. uncinatum*.

32. Desmodium incanum DC., Prodr. 2:332 (1825); Benth. in Martius, Fl. Bras. 15:98 (1859) & synonyms cited; Nicolson, Taxon 27:365–370 (1978); McVaugh, Fl. Novo-Galiciana 5:468 (1987); Green, Fl. Austral. 49: 179 (1994); *Hedysarum incanum* Sw., Nov. gen. 107 (1788), *nom. illeg.* **Type:** Plumier (ed. Burman), Pl. Amer. 140 t. 149. f.1. (1757) "Hedysarum foliis ternatis, ovatis, floribus specatis".

Desmodium frutescens Schindl., Rep. sp. nov. reg. veg. 21:9 (1925) & synonyms cited. **Type:** Jacq., Hort. Vindob. 3:47. t. 89 (1776) "Hedysarum frutescens Jacq. non L."

Desmodium canum Schinz & Thellung, Mem. Soc. Neuchatel. Sci. Nat. 5:371 (1913); Schubert, Fl. Trop. East Africa. Legum. Papilion. 456 (1974); Verdcourt, Man. New Guinea Leg. 394 (1979); *Hedysarum canum* Gmel., Syst. Veg. 2:1125 (1792). **Type:** as for *D. incanum* DC.

***Specimens*: Queensland.** MORETON DISTRICT: Indooroopilly, Brisbane 27°31'S 152°59'E, Mar 1994, *Pedley* 5678 (BRI); Scarborough, Redcliffe City, 27°12S 153°07'E, May 1994, *Galagher s.n.* (BRI).

***Distribution and habitat*:** This species is a native of tropical America, often used as a cover crop and naturalised in many countries. It occurs as a weed in a lawn at Indooroopilly and on a walk path at Redcliffe, both in the extreme south-east of Queensland. Prior to its collection in the field it had been grown experimentally under glass in the vicinity of Brisbane at least as early as 1964.

***Affinities*:** The plant resembles *D. heterocarpon*, but has an open inflorescence and its leaves have more primary lateral veins. Its fused stipules distinguish it from other species. Map 45.

***Note*:** Nicholson, in his detailed discussion of the complex nomenclature of *D. incanum* and *D. canum*, pointed out that both Bentham and Schindler considered *D. ancistrocarpum* (Ledebour) DC. (based on *Hedysarum ancistrocarpum* Ledebour) to belong to this species. In the interest of stability however, he refrained from reviving the earlier name. If *D. ancistrocarpum* is indeed conspecific with *D. incanum* it is to be expected in the interest of continuing stability that the name *D. ancistrocarpum* be rejected in favour of *D. incanum*.

Phyllodium Desv., J. Bot. Agric. 1:123. t.5. f. 24 (1819); Benth. in Miq., Pl. Jungh. 217 (1852); Ohashi, Ginkgoana 1:260 (1973); *Dicerma* sect. *Phyllodium* (Desv.) Benth. in Benth. & J.D. Hook., Genera Pl. 1:519 (1865); *Desmodium* subg. *Phyllodium* (Desv.) Baker in J.D. Hook., Fl. Brit. India 2:162 (1876). **Type:** *Phyllodium pulchellum* (L.) Desv.

Phyllodium is a genus allied to *Dendrolobium*. In *Dendrolobium* flowers are arranged in fascicles or short (rarely long) racemes which are subtended by foliage leaves, whereas in *Phyllodium* fascicles of flowers are usually subtended and hidden by 'foliar bracts'. These foliar bracts are modified foliage leaves: the terminal leaflet is lost or reduced to a terminal seta and the lateral leaflets are much reduced in size; stipules and stipels are retained. In other Desmodieae flowers are subtended by stipule-like bracts not at all like foliage leaves in colour, texture or shape.

Ohashi (1973) described subg. *Prainea* to accommodate *P. insigne* (Prain) Schindl. in which foliar bracts are only sporadically developed. In the field, plants of *P. hackeri* sp. nov. produce foliar bracts at the bases of inflorescences only, but plants grown under glass (*Hacker* 389A, BRI) have foliar bracts at most nodes of the inflorescence. Thus, since the production of foliar bracts is largely controlled by environmental factors, their presence or absence is not a sound basis for the recognition of a subgenus. Consequently, subg. *Prainea* is ignored.

In Australia there are three species of *Phyllodium*; namely, *P. pulchellum* with an ill-defined variant described here as a variety, a well-defined species confined to northern Queensland (*P. hackeri*) and a third, known only from one specimen.

Key to species

1. Pedicel 7–12 mm long; flowers large: calyx c. 5 mm long, standard 10–10.5 mm long and 5–6 mm wide pods with up to 5 articles, each 5.5–7 × 5 mm . . . . **1. P. hackeri**
   Pedicel to 3 mm long; flowers small: calyx to 3 mm long, standard to 7 mm long and 4 mm wide; pods with up to 3 articles, each 4 × 3.5 mm . . . . 2.

2. Foliar bracts subtending fascicles of flowers at anthesis; calyx with upper lobe narrowly ovate, lower lobe 1.5–2 mm long, longer than others . . . . **2. P. pulchellum**
   Foliar bracts a few at base of inflorescence at anthesis; calyx with upper lobe broadly ovate, obtuse, lower lobe to c. 1 mm long, about as long as upper lobe . . . . **3. P. sp.A**

1. Phyllodium hackeri Pedley, **sp. nov.** forsan affinis *P. insigne* (Prain) Schindler bracteis foliatis ± caducis praedito sed a quo foliolis infra non dense lanatis, interdum parvioribus differt, sed similis *P. pulchello* (L.) Desv. a quo bracteis foliolatis ± caducis, pedicellis longioribus (7–12 mm), floribus grandioribus, articulis leguminis multo grandioribus differt: **Typus:** Queensland. COOK DISTRICT: between Irvinebank and Petford, c. 17°20'S 145°00'E, February 1980, *J.R. Clarkson* 2832A (holo:BRI; iso:K, MBA, PERTH, QRS).

Phyllodium sp. (Montalbion *H.S.McKee* 9430) Pedley in Henderson, Queensland Plants: Names & Distribution: 84 (1997).

Desmodium megaphyllum auct. non Zoll.; Knapp-van Meeuwen, Blumea 12:16 (1964).

Shrub to 1.5 m tall; branchlets angular with moderately dense appressed hairs 0.4 mm long. Leaves 3-foliolate; stipules subulate, broad at the base, c. 5 mm long; petioles 12–30 mm long, rachis 15–25 mm long; leaflets ovate or elliptic, rounded at the base, obtuse or slightly retuse, mucronulate, sparse minute uncinate hairs and appressed hairs on veins above, minute (c. 0.2 mm long) appressed hairs on lower surface; terminal leaflet 75–105 mm long, 30–50 mm wide, 2–2.5 times longer than wide; lateral leaflets smaller, 60–80 mm long, 30–40 mm wide; pulvinuses 2.3–2.8 mm long, stipels 1.5–2.2 mm long; foliar bracts (often absent) bifoliolate, the terminal leaflet reduced to a bristle, leaflets with indumentum of foliage leaves, petiole 3–6 mm long, petiolules c. 2.5 mm long, stipels c. 1.5 mm long; leaflets ovate, attaining 25 mm long, 15–20 mm wide. Flowers in fascicles of up to 16, in axillary or terminal racemes, each fascicle subtended by a foliage leaf or a foliar bract or without subtending leaf or foliar bract; bract c. 1 mm long; pedicels slender, appressed pubescent 7–12 mm long. Flowers: calyx 4.7–5.1 mm long, with minute uncinate hairs and appressed white hairs c. 0.3 mm long , tube 2.2 mm long, upper and lower lobes 2.5–2.9 mm long, laterals about as long as the tube; corolla cream; standard oblong, obtuse or slightly retuse at apex, 10–10.5 mm long, 5–6 mm wide; wings 7.3–8.5 mm long, auriculate at base, with claw c. 2 mm long; keel petals auriculate, 8.5–9 mm long, 4–5 mm wide on claw 2.5–3 mm long; ovary sparsely pubescent. Pod with upper suture straight, lower somewhat indented, with up to 5 articles each 5.5–7 mm long, c. 5 mm wide, reticulately veined, glabrous except for appressed hairs on each suture; seed 3–3.7 mm × 2.5–3.2 mm with a small rim aril.

Specimens**: Queensland.** Cook District: Lankelly Creek, McIlwraith Ra., 13°53'S 143°14'E, Jun 1992, *Forster* PIF 10365 & *Tucker* (BRI); Montalbion on Petford-Herberton road [17°24'S 145°09'E], Apr 1962, *McKee* 9430 (BRI, CANB); Irvinebank-Emuford, 17°25'S 145°00'E, Jan 1972, *Hyland* 5814 (BRI, QRS); cultivated from seeds collected on Chillagoe road, 17°25'S 145°04'E, Apr 1987, *Hacker* BH389A (BRI).

Distribution and habitat**:** *Phyllodium hackeri* has a limited distribution in northern Queensland where it occurs on sand and shallow rocky soil. Map 46.

Affinities**:** On account of its frequent lack of foliar bracts *P. hackeri* might be considered related to *P. insigne* or *P. pulchellum* var. *glabrius*. The relationship to other species is, however, not close and *P. hackeri* is rather isolated in the genus. Fascicles of flowers sometimes subtended by reduced foliage leaves in *P. hackeri* indicate that *Phyllodium* and *Dendrolobium* are closely related.

Etymology**:** The species is named to honour Dr J.B. Hacker, CSIRO, Brisbane who first brought the species to my attention. Plants grown in the glasshouse by Dr Hacker demonstrated that the production of foliar bracts by individual plants varied during its growing period.

2. Phyllodium pulchellum (L.) Desv., J. Bot. Agric. 1:124 t. 5. f. 24 (1813), Mem. Soc. Linn. Paris 4:324 (1825); Benth. in Miq., Pl. Jungh. 217 (1852); Schindl., Rep. sp. nov. reg. veg. 20:270 (1924): Ohashi, Ginkgoana 1:276 (1973); Pedley, Rev. Handb. Fl. Ceylon 10:165 (1996); *Dicerma pulchellum* (L.) DC., Ann. Sci. Nat. 4:236 (1825), Prodr. 2:239 (1825), Mem. Leg. 328 (1826); *Desmodium pulchellum* (L.) Benth., Fl. Hongkong 83 (1961), Fl. Austr. 2:231 (1864); van Meeuwen, Reinwardtia 6:256 (1962); Liu & Chuang, Taiwania 8:89 t. 16 (1962); Verdcourt, Man. New Guinea Leg. 404 (1979); *Meibomia pulchella* (L). Kuntze, Rev. Gen. 1:197 (1891); *Hedysarum pulchellum* L., Sp. Pl. 747 (1753). **Type:** Herb. Linn. No 921.24 (LINN, lectotype *fide* Pedley in Turland & Jarvis (1997).

Two varieties are recognised in Australia.

2a. Phyllodium pulchellum (L.) Desv. var. **pulchellum.**

Foliar bracts always present, persisting until pods are produced; articles of pod glabrous or appressed pubescent on faces, appressed pubescent on sutures.

Specimens**: Northern Territory.** Keep River National Park, 15°48'S 129°05'E, Apr 1982, *King* 72 (DNA); Elcho Is., 11°57'S 135°43'E, Jul 1975, *Maconochie* 2115 (BRI, DNA, K). **Queensland.** Cook District: Iron Range, 12°43'S 143°17'E, Jul 1988, *Hacker* JBH 892 (BRI); North Kennedy District: 'Maidavale', E of Mingela, Apr 1991, *Bean* 2950 (BRI).

Distribution and habitat**:** *Phyllodium pulchellum* var. *pulchellum* occurs only sporadically in Australia and is nowhere common. In the Northern Territory it occurs on edge of coastal vine forests and in similar situtations in Cape York Peninsula, but usually among boulders on hillslopes in eucalypt woodland in north-central Queensland. Map 47.

2b. Phyllodium pulchellum var. **glabrius** Pedley **var. nov.**, a *P. pulchello* var. *pulchello* bracteis foliatis in inflorescentiis tantum sporadice productis, articulis leguminis glabris vel pilis aliquot in suturis ornatis differt. **Typus:** Northern Territory. Muldiva Creek, 14°01'S 130°43'E, February 1989, *C.R. Dunlop* 976 & *G. Leach* (holo: DNA; iso: BRI, K, MEL).

Foliar bracts only sporadically producted, often absent on fruiting inflorescences; pod articles glabrous with a few hairs on sutures.

***Specimens*:** Northern Territory: Upper East Alligator Region, 12°45'S 133°15'E, Apr 1988, *Russell-Smith* 5137 & *Lucas* (BRI, DNA, K, MEL); Leader Creek, Gunn Point, 12°12'S 131°06'E, Mar 1982, *Wightman* 226 (DNA).

***Distribution and habitat*:** *Phyllodium pulchellum* var. *glabrius* occurs in the northern part of the Northern Territory in eucalypt communities, usually on sandy soils. The plant grows in a harsher environment than *P. pulchellum* var. *pulchellum* and the differences between the two may be due to the differences in habitat. Map 48.

3. Phyllodium sp. A

Shrub to 1 m; branchlets ribbed with moderately dense indumentum of matted white hairs 0.3 mm long. Leaves 3-foliolate; stipules subulate, to 6 mm long, c. 3 mm wide at the base; petioles 17 mm long, axis 20 mm long; leaflets ovate, rounded at the base, obtuse mucronulate, discolorous, sparse appressed hairs on upper surface, sparse curved hairs on lower, hairs 0.3 mm long; terminal leaflet 95–105 mm long, 50–55 mm wide, lateral leaflets smaller 55–70 mm long, 27–37 mm wide, about 10 lateral veins on each side of midrib all about twice as long as wide; foliar bracts present only at base of inflorescence, 2-foliolate, leaflets broadly ovate, truncate at apex, 7–9 mm long, 6–7 mm wide, sparsely hairy on both surfaces. Flowers in fascicles of up to 7 in axillary and terminal racemes up to 20 cm long; the rachis with indumentum similar to that of branchlets; primary bracts stipule-like to 2 mm long, pubescent at base and on margins; pedicels c. 3 mm long; bracteoles 0.6–0.8 mm long, 0.4 mm wide. Flowers: calyx c. 2.5 mm long with moderatly dense appressed hairs; tube c. 1.5 mm long, upper and lower lobes c. 1 mm long, laterals c. 0.7 mm long; corolla cream; standard oblong or obovate, slightly retuse at apex, 6–7 mm long, c. 4 mm wide; wings 5.8–6 mm long, including claw 1.7–2 mm long, 1–1.2 mm wide, deeply auriculate; keel petals longer and wider than the wings, c. 7 mm long, including claw c. 2 mm long, c. 2.5 mm wide; ovary laterally compressed, glabrous on faces with fringe of hairs on margins, with 1–3, usually 2, ovules.

***Specimen*:** **Northern Territory.** Adelaide River, c. 1 km downstream from Daly River road, Feb 1979, *Rankin* 1754 (BRI, DNA, K).

***Distribution and habitat*:** The species is known from the single specimen cited. There is no information on its habitat. Map 49.

***Affinities*:** *Phyllodium pulchellum* appears to be the nearest relative of the species. Because I know of the taxon from one specimen only, I have not formally described it.

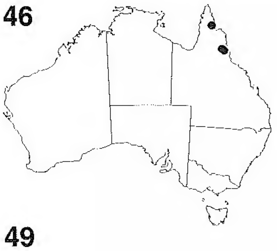
Tadehagi Ohashi, Ginkgoana 1:280 (1973) and synonyms cited; Pedley, Rev. Hand. Fl. Ceylon 10:168 (1996). **Type**: *Tadehagi triquetrum* (L.) Ohashi.

Tadehagi appears to be somewhat removed from *Desmodium* and immediately related genera but its relationship to *Droogsmansia* is close and requires further investigation.

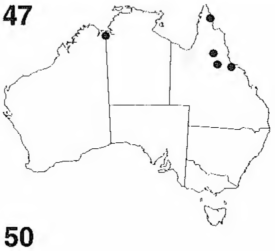
Ohashi included three species in the genus each of which he referred to a different subgenus. He recorded *T. triquetrum* subsp. *triquetrum* from northern Australia and his distribution map indicates that it extends into south-eastern Queensland. He did not cite any specimen from Australia and the only one I have seen bears the label 'Tropical East Australia, *Evans*' (MEL). The record is a doubtful one. A species related to *T. triquetrum* does however occur.

Tadehagi robustum Pedley, **sp. nov.** a *T. triquetro* (L.) Ohashi bracteolis brevibus et leguminibus plerumque articulis paucioribus instructis; a *T. triquetro* subsp. *triquetro* foliolis minus quam 3-flo longioribus quam latis, leguminis articulis grandioribus in suturis non nisi parce pubescentibus, a *T. triquetro* subsp. *pseudotriquetro* (DC.) Ohashi leguminibus grandioribus in suturis non nisi parce pubescentibus, a *T. triquetro* subsp. *auriculato* (DC.) Ohashi leguminibus maturis neque suberosis neque glabris, a *T. triquetro* subsp. *alato* (DC.) Ohashi leguminibus glabris differt. **Typus:** Western Australia. Mitchell Plateau (c. 1 km N of CRA mining camp), 14°49'S 125°40'E, January 1982, *B.R. Maslin* 5085 (holo: PERTH; iso: MEL, K).

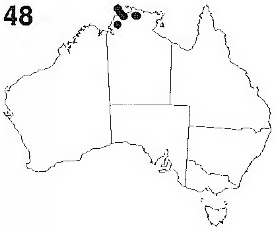
Shrub to 1.2 m tall, sometimes branched from the base; branchlets strongly triquetrous, the angles ribbed, glabrous or with appressed hairs



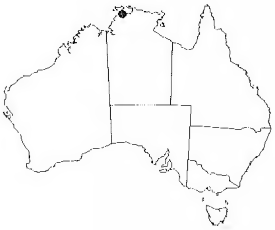
46. *Phyllodium hackeri*



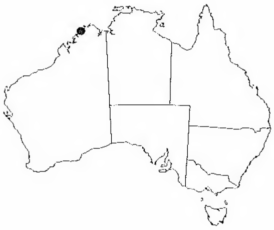
47. *Phyllodium pulchellum* var. *pulchellum*



48. *Phyllodium pulchellum* var. *glabrius*



49. *Phyllodium* sp. A



50. *Tadehagi robustum*

to 0.7 mm long on the ribs; stipules 20–25 mm long, 6–10 mm wide at the base. Leaves and petiolar wing discolorous, coriaceous, glabrous or with a few appressed hairs on major veins beneath; petiole 17–40 mm long, wing 2.5–6 mm wide on each side of petiole, widest in distal quarter; leaf blades oblong or ovate, acute at apex, rounded or auriculate at base, 55–135 mm long, 25–60 mm wide, 2–2.5 times longer than wide. Inflorescences terminal or in upper axils, to 35 cm long; fascicles usually 2-flowered; primary bracts 7–12 mm long decreasing in size along rachis; pedicels to 3.5 mm long; secondary bracts and bracteoles c. 1 mm long. Flowers: calyx with scattered stiff ± appressed white hairs and denser shorter hooked erect ones; tube 1.7 mm long, upper and lateral lobes c. 2.2 mm long, lower 2.7 mm long. Corolla dark pink or red; standard orbicular, 5 mm long, 6 mm wide, on stout claw 1.5 mm long; wings widest towards the tip, 4.5 mm long, 2.5 mm wide, auriculate at the base, on a claw 1.8 mm long; keel petals slightly shorter than the wings, 3.7 mm long, 2 mm wide, auriculate at the base, on a claw 2.3 mm long; ovary sparsely pubescent, moderately so on the margins. Pods sessile, of 4–5 articles, slightly indented on both sutures, the middle articles c. 5 mm long, 8 mm wide, the proximal and distal ones longer. Seeds oblongoid, with a well developed rim aril, 3.6–3.7 mm long, 2.6–2.7 mm wide.

Other specimens (all Mitchell Plateau, all PERTH): May 1978, *Kenneally* 6814; Jun 1976, *Kenneally* 4946; Feb 1979, *Beard* 8327; Mar 1982, *Keighery* 4740.

Distribution and habitat: The plant is apparently restricted to the Mitchell Plateau of the Kimberley region of Western Australia where it occurs in woodland, sometimes in wetter areas, some seasonally flooded, and was reported by one collector to be common. Map 50.

Affinities: Though the taxon could be referred to *T. triquetrum* sensu lato it does not accord well with the subspecies recognised by Ohashi. It differs from subsp. *triquetrum* in having leaflets less than 3 times longer than wide and larger pod articles only sparsely hairy on sutures; from subsp. *pseudotriquetrum* in its larger pods only sparsely hairy on sutures; from subsp. *auriculatum* in its mature pods being neither corky nor glabrous; from subsp. *alatum* in its pods being not glabrous; and from all in its short bracteoles and pods usually with fewer articles.

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The work would have been sketchy indeed without the extensive collections of Mr Roy Pullen and I thank him for them and also for his annotations and notes on herbarium specimens which have been of great value. Ms Judy Wheeler (PERTH) drew my attention to *Alysicarpus cheelii* C.A. Gardner which I would surely have missed otherwise.

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